DEPARTMENT OF LIFE SCIENCES
DEPARTMENT OF MEDIA AND COMMUNICATION
INTERNAL QUALITY ASSURANCE CELL - CUTN

தொகை

A COMPENDIUM OF THE BIODIVERSITY OF CENTRAL UNIVERSITY OF TAMIL NADU

VOLUME 1

E. M. SHANKAR C. LATCHOUMYCANDANE R. ALEXANDAR

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ACKNOWLEDGEMENT

Fauna: Biodiversity of CUTN Volume-I is an outcome of the keen interest and support provided by the Central University of Tamil Nadu, Thiruvarur. The book was envisioned by Prof. A. P. Dash, Vice Chancellor, Central University of Tamil Nadu as an encyclopedia of campus biodiversity, with receipt of huge support from students, teachers, researchers, non-teaching staff and public in our attempt to create a source book/material, both for the campus community and environmentalists on the profoundly rich biodiversity of CUTN campus.

We gratefully acknowledge the support provided by Dr. S. Bhuvaneswari, Registrar, and Dr. A. Ragupathy, Controller of Examinations, Central University of Tamil Nadu,
Thiruvarur, for facilitating the successful publication of this resource-rich manual.

We gratefully acknowledge Prof. Sulochana Shekhar, Director and Coordinator, IQAC,
Dr. S. Nagarajan, Dean of Student Welfare, and Dr. Francis Barclay, Head in-Charge,
Department of Media and Mass Communication for all the supports
provided for the timely completion of the book.

Our thanks are due to Ms. Sakthi Narpavi for contributing to the chapter on aves and Mr. Sudharsan for aiding to compile the butterfly chapter.
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for editing and compiling the book chapters.

Our thanks are also due to all the students of the Department of Life Sciences for their tireless supports. We also thank all the office staff of the Department of Life Sciences for their immense efforts to successfully complete the book.

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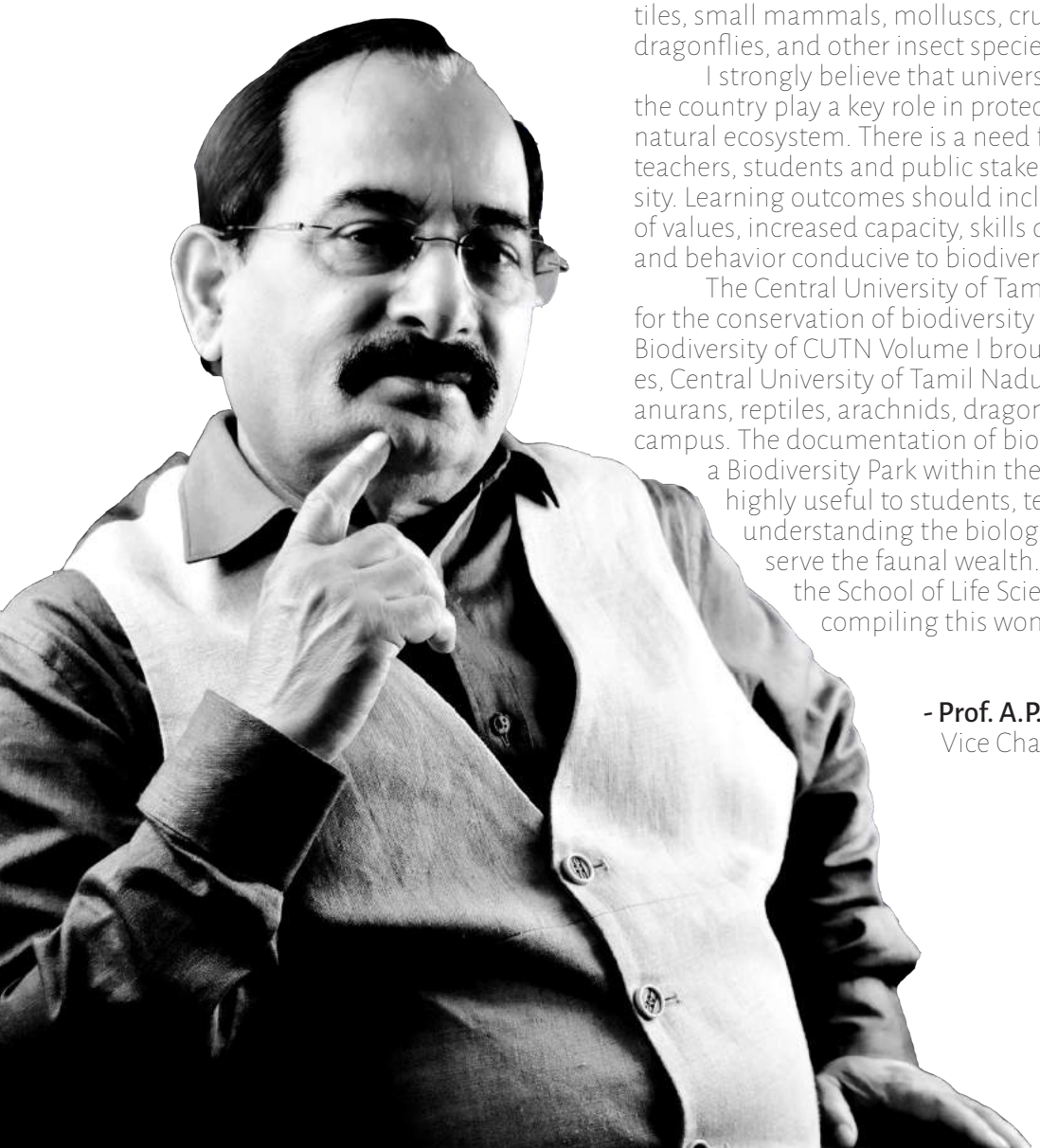
Preface



Biodiversity supports the effective functioning of the ecosystem. The indiscriminate effect of human activities have witnessed a magnification in recent years owing to over-population and global climate change that have greatly reduced the wealth of our biodiversity. According to the Convention on Biological Diversity (CBD), species are on the verge of extinction at rates 1,000 times the background rates typical of the earth's past. The direct causes of biodiversity loss have shown no signs of abating. Every year, between 18,000 and 55,000 species become extinct. Our biological heritage is the most important on the entire planet, critical for protection and conservation.

Central University of Tamil Nadu (CUTN) situated along the Vettaar, a tributary of the Cauvery is home to a wide spectrum of floral and faunal diversity. The varied vegetation and small water ponds within the campuses provide habitats for many avifaunal diversity among which water birds are flagship species to her students, teachers and public because of their glamour, abundance, visibility and social behavior. The other faunal diversities are reptiles, small mammals, molluscs, crustaceans, annelids, butterflies, damsflies, dragonflies, and other insect species adding laurels to her ecosystem.

I strongly believe that universities, colleges and school campuses across the country play a key role in protecting and conserving biodiversity and natural ecosystem. There is a need focus education programs to sensitize teachers, students and public stakeholders to protect and conserve biodiversity. Learning outcomes should include academic understanding, acquisition of values, increased capacity, skills development and the adoption of attitudes and behavior conducive to biodiversity conservation and protection.

The Central University of Tamil Nadu (CUTN) ensures its commitment for the conservation of biodiversity and its natural ecosystem. The Fauna: Biodiversity of CUTN Volume I brought out by the Department of Life Sciences, Central University of Tamil Nadu, is a compendium of birds, butterflies, anurans, reptiles, arachnids, dragonflies and damsflies seen widely within the campus. The documentation of biodiversity will be more supportive to develop a Biodiversity Park within the CUTN campus. I am sure, the book will be highly useful to students, teachers and staff of CUTN, and is aimed at understanding the biological wealth of CUTN and its efforts to conserve the faunal wealth. I am to congratulate the entire team from the School of Life Sciences, Central University of Tamil Nadu for compiling this wonderful faunal encyclopedia of the campus.

- Prof. A.P. Dash
Vice Chancellor, CUTN

Registrar's **Preface**

Harnessing and sustaining biodiversity marks the beginning of a healthy ecosystem. Human wellness is linked to availability of a healthy ecosystem in place, which operates via interplay between living organisms that unites the atmosphere, geosphere, and hydrosphere into a complex environmental system within which we humans do thrive. Embracing the vision and mission of CUTN, the Department of Life Sciences contributes enormously to the understanding and functioning of living organisms in concert with the surrounding environment. With this aim, it has brought to life, the Fauna: A Compendium of Biodiversity of CUTN Volume I to make us understand the importance of animal species coexisting with the other biotic and abiotic stakeholders of the environment. I appreciate the efforts of the entire editorial team from the Department of Life Sciences as well as the IQAC-CUTN and the Department of Media and Mass Communications for providing an opportunity to celebrate the colorful species of the diverse fauna around, assisting us in many ways to thrive and sustain on this complex universe.

- Dr. S. Bhuvaneswari
Registrar, CUTN

Preface of Editors

Natural vegetation and its associated faunal diversity are an integral part of university campuses. Green campus are important for the image of the university and as an essential component of the campus environment. The role of universities are essential for sustainable practices and conserving biological diversity. Thus, documenting flora and fauna and their natural habitats are vital for ecosystem well-being, species survival and human welfare, because many species are valued as bio resources. Further, knowledge on biodiversity is important not only considering their potential ecological role and economic importance as well as aesthetic, cultural and recreational purposes.

Department of Life Sciences has initiated various steps to conserve CUTN biodiversity and improving green campus. Seed ball concept were introduced in order to improve native plant species within the CUTN campus. Around 200 native tree saplings were planted as event of World wildlife week celebration during October 2017, besides, the university administration rapidly increasing its green cover with suitable plant species and biodiversity conservation efforts like removal of invasive plants Prosophis juliflora and various green energy practices within the campus.

This book on the Fauna of Central University of Tamil Nadu (CUTN) is an attempt to explore faunal diversity in the CUTN campuses, useful to both researchers, students, ecologists, conservationists and public. In this we have included the checklists and detailed notes on birds, butterflies, amphibians, reptiles, arachnids, dragonflies and dams flies. Let us take an oath to conserve our CUTN biodiversity for our present and future generations.
We welcome valuable suggestions from readers for improvement in subsequent editions.

- Dr. E. M. Shankar
Dean, School of Life Sciences

Preface of Editors

It is indeed a proud moment for me to pen down the foreword to this book, "Flora and Fauna of CUTN"". It takes me back to the middle of last year. To our IQAC meeting, where we began discussing, having a book on the flora and fauna of CUTN considering the variety of species found on the campus.

The discussion became a decision when we shared the idea with our Hon'ble Vice-Chancellor, who encouraged us to go ahead. The task was assigned to the Department of Life Sciences under the leadership of Dr. Shankar, Head, Department of Life Sciences and an IQAC member. The decision has today been transformed into a wonderful book, by their tireless effort and dedication in documenting the biodiversity of CUTN campus. Congratulations to theentire team. A special thanks to Dr. Francis P. Barclay and Mr. Girishwaran TP and Mr. Naveen V for the concept and design of the document..Now, the book has become an asset to CUTN. Once again, my Heartiest Congratulations to the entire team. Well Done.

Prof. Sulochana Shekhar
IQAC Coordinator

Preface of Editors

With 500-odd green acres of shrubs, seedlings and an inviting atmosphere dotted with the ziggurats of academic buildings, the turf of CUTN is home to hundreds of varied flora-fauna species.

Apart from the home birds and animals, the CUTN grass waters nurture lakhs of seasonal winged visitors. Several birds are pedestrian at this place-the Lapwings are one of 'em. On any given day throughout the year, a casual stroll across the campus can be an enthralling experience, especially for birders and nature enthusiasts.

Understanding the importance of documentation and preservation of these blithe beings, this mammoth measure of recording the species on CUTN pastures has been initiated. It has been enticing as much as effortful it could be! While thanking Prof. A. P. Dash (CUTN Vice-Chancellor), Dr. E. M. Shankar (Dean of the School of Life Sciences) and the other life scientists of CUTN for initiating and spearheading this campaign, I also appreciate the involvement and efforts of the IQAC and the Department of Media and Communication to make this document a valuable one. We are delighted to present to you the first in a series of such species documentations, starting with the fauna.

Dr. Francis P. Barclay,
Head (In-charge),
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Biography of Editors

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Shankar's area of research is Immunology and Medical Microbiology. Before getting on board CUTN, he was an Associate Professor of Immunology at the Department of Medical Microbiology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia. He serves on the editorial boards of several leading international biomedical journals, and owns over 120 PubMed-Indexed publications with a h-index of 27 & an i10-index of 67 from ~2300 citations.

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Latchomycandane is an American Board Certified toxicologist. Before joining CUTN, he has been working as a Research Associate in the Department of Cellular & Molecular Medicine, Cleveland Clinic, USA. Latch is a member of several global societies including the Society of Toxicology & the Endocrine Society (USA). He has published over 30 research papers in peer-reviewed international journals & his publications have received >1600 Scopus citations with a h-index of 24.

R Alexandar MPhil PhD
Dr. R. Alexandar is an Assistant professor currently with the Department of Life Sciences, Central University of Tamil Nadu and has a Master's and Doctoral degree in Ecology and Environmental Sciences. His teaching and research fields are biodiversity conservation, environmental education, climate change and evolutionary biology. He has published more than 20 research articles 9 scientific letters in refereed national and international journals and he has published three book chapters.

BIRDS

The Central University of Tamil Nadu (CUTN) campus situated on both sides of a major tributary of the famous River Cauvery in the heart of the Delta region, seven kilometres to the north-west of Thiruvarur town with 516.76 acres of land. The academic campus is located in Neelakudi village (412.03 acres) and residential campus located in the Nagakudi village (104.73 acres). River Vettaaru runs between the main academic and residential complexes. The campus situated in a riverine freshwater wetland which attracts entire spectrum of floral and faunal diversity. The CUTN campuses attracts many passerine and non-passerine birds, the passerine birds such as Bulbuls, Robins, Munias, Cuckoos, Grey francolins, Tailorbirds, Crows, and flycatchers. Non-passerines birds that include Owls, Pigeons, Doves, Kites and Woodpeckers. The wetland birds like Herons, Storks, Egrets, Ducks, Darters and Cormorants. The ground-nesting birds like Indian Peafowl, Francolin, Skylarks and Pipits. Water birds have long attracted the attention of the students, teachers and public because of their beauty, abundance, visibility and social behavior, as well as for their aesthetic, recreational and maintaining healthy ecosystem of CUTN campus. Birds are well adapted to their habitat and live according to their varied nature in the CUTN campus.

The preliminary survey reported around 79 birds' species in the CUTN campus. The campus attracts a huge variety of birds like human associated birds such as House Crow, Rock Pigeon, Common Myna, Asian Koel, Purple rumped Sunbird, Red-vented Bulbul, Indian Robin, White-browed Wagtail, Greater Coucal, Common Tailorbird, Spotted Owlet, and Black Kite. Wetlands birds such as Common Moorhen, Little Cormorant, Oriental Darter, White-breasted Waterhen, Watercock, Open-billed stork, Black-headed Ibis, Indian Pond Heron, Lesser Whistling-duck, White-breasted Kingfisher and Brahminy Kite. Woodland birds such as Jungle Babblers, Indian Treepie, Common Hawk-cuckoo, Black-rumped Flame-back woodpecker, Eurasian Golden Oriole, Common Hoopoe, Pied Cuckoo, Shikra and Asian Paradise flycatcher. The grassland birds include, Weaver Bird, Pipits, Francolins, Peafowl, Warblers and Munias. The CUTN campus has varied habitats such as ponds, rivers, wood lands in the residential campus, grass land in the academic campus, shrubs, herbs and macrophytic plants attracts a large number of birds and provide roosting and breeding habitats for migratory water birds. There are four roosting habitats found within the campus, which provides habitat for migratory water birds.

Chapter-1

Dendrocygna javanica(Horsfield,1821)

Lesser Whistling Duck

Local names: Siru seezhkai siravi (Tamil), Yeranda(Malayalam), Sillaebaathu (kannada), Seelhi,Seelkahi (Hindi).

Size: 42cm.

Field characters: A small, well proportioned, tree-nesting duck. Pale brown overall with a darker brown crown and nape, warmer chestnut underparts, and chestnut-fringed feathers on the back. Note the nearly indistinguishable orange-yellow eyering and the dark gray bill and legs. Sexes similar; juveniles duller. A gregarious duck found in shallow water bodies with abundant vegetation. Flies with rapid wingbeats on broad dark wings flashing chestnut shoulders and a chestnut rump.

Distribution: Resident more or less throughout the Indian Union.

Food: Largely vegetarian-shoots and grain-but also eats small fish and snails,etc.

Call: A wheezy whistling “seasick-seasick.”

Nesting: Season-chiefly the monsoon, June to October. Also December-January. Eggs: 7-12, Ivory white. ■

Streptopelia chinensis (Scopoli,1786)

Spotted Dove

Local names: Manipura (Tamil), Aripraav (Malayalam), Chorehakki (Kannada), Poda bellaguvva (Telugu).

Size: 30cm.

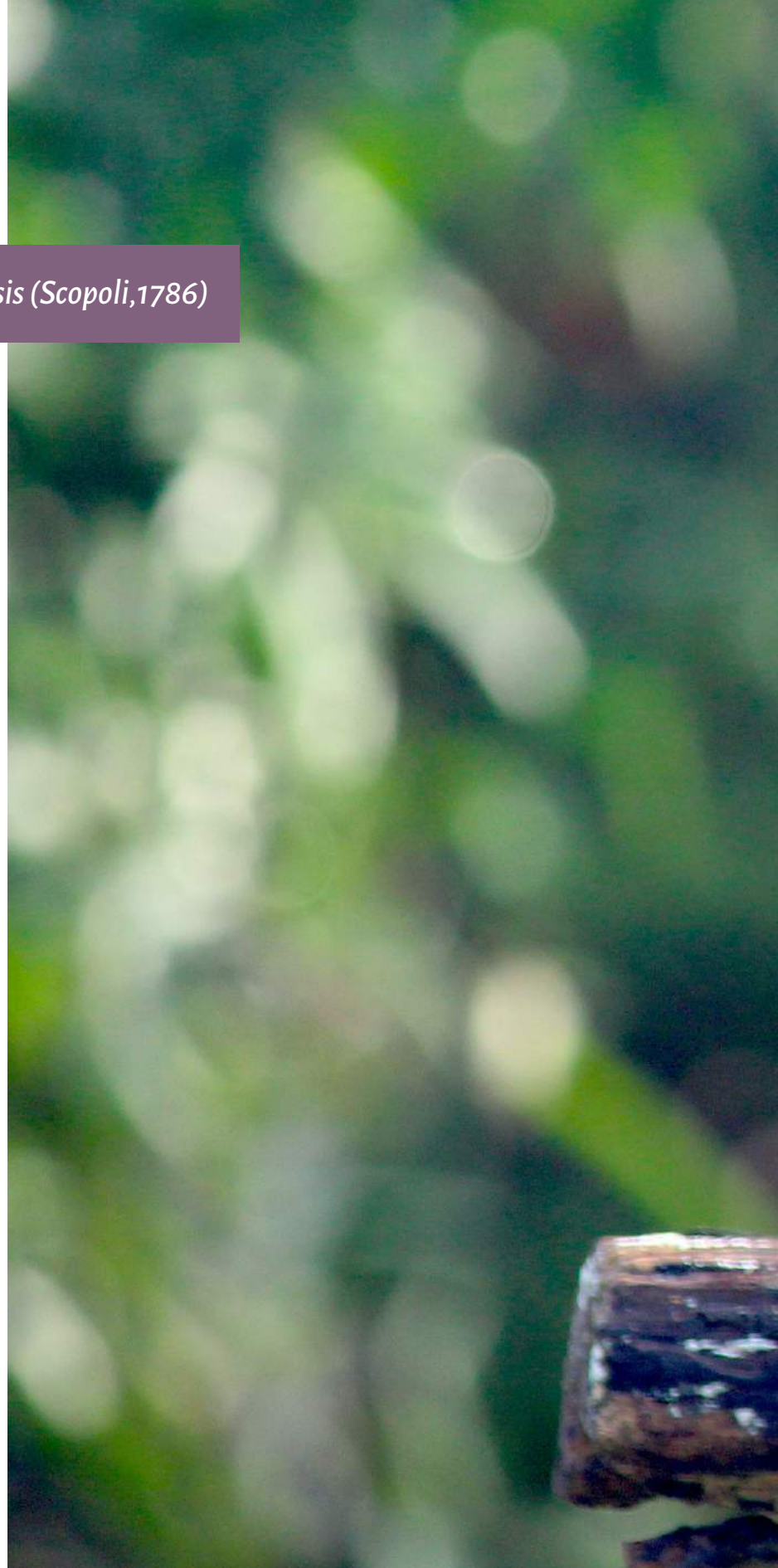
Field characters: A large, grayish brown dove with a pinkish breast. Named for the black patch with white spots on the neck. Can look like a small raptor in flight, especially during the gliding courtship flights. Sexes alike. Found in pairs or parties.

Distribution: All the Indian Union except the arid NW. parts.

Food: Grains, seeds.

Call: A slow series of low “coos.”

Nesting: Season- Practically all year. Eggs:2, white. ■



Phaenicophaeus viridirostris (Jerdon,1840)

Blue-faced Malkoha

Local names: Neelamuga poonguyil (Tamil), Neelakannan, Pacha chundan (Malayalam), Wamana kaki (Telugu).

Size: 39cm.

Field characters: A greenish ashy grey non-parasitic cuckoo with rufous suffused underparts. Bright green bill; naked blue patch round eye; long, broad, graduated, white-tipped tail. Sexes alike. Found single or as pairs skulking in dry thorn jungle.

Distribution: Peninsular India from Gujarat to Orissa to Kanyakumari.

Food: Caterpillars, insects, lizards, other small animals, also some berries.

Call: Usually silent. A low croak kraa, sometimes.

Nesting: Season- chiefly March to May, but also other months. Eggs: normally 2, chalky white, roundish. ■

Hierococcyx varius (Vahl,1797)

Common Hawk Cuckoo

Local names: Akka kuyil (Tamil), Pekkuyil (Malayalam), Kutti pitta (Telugu), Papeeha (Hindi).

Size: 34cm.

Field characters: A medium-sized bird that resembles a Shikra in plumage. Males have ashy-gray upperparts, white underparts with rufous streaking and barring, a broadly barred tail, and a distinct yellow eye rim. Females and juveniles are browner with bolder streaking below. The species is arboreal and rarely descends to the ground. Found in gardens, groves, and deciduous and semi-evergreen forests.

Distribution: Throughout Indian Union. Resident and Locally migratory.

Food: Hairy caterpillars, insects, berries, wild figs, etc.

Call: During their breeding season in summer males produce loud, repetitive three note calls that are well-rendered as 'brain-fever ' (popularly known as the brainfever bird).

Nesting: Season-March to June, coinciding with that of Turdoides babblers on whose nest it is parasitic. Eggs: usually a single in each nest, blue, like that of the host. Hatchling reared to maturity by foster parents. ■

Anastomus oscitans (Boddaert,1783)

Asian Openbill Strok

Local names: Nathai kothi naarai (Tamil), Cherakokkan (Malayalam), Galu konga (Telugu), Gungla, Ghonghila, Ghungil (Hindi).

Size: 81cm.

Field characters: A relatively small stork species with a grayish to white body and black wings and tail with a hint of gloss. The Asian Openbill gets its name from a distinctive gap in the dull grayish yellow bill. Pinkish legs. Asian Openbills inhabit wetland habitats including shallow marshes, flooded agricultural fields, and lakes. From a distance they could be confused with herons, but they can be clearly distinguished from herons by their feeding habits—wading slowly through shallow water. Sexes alike. Found in twos and threes or flocks.

Distribution: Throughout the plains of the Indian Union.

Food: large Ampullaria snails in marshes, frogs, crabs, large insects.

Call: Loud and hoarse.

Nesting: Season- mostly between July and September. Eggs: 2 to 4, white, close textured.

Anhinga melanogaster (Pennant, 1769)

Oriental Darter

Local names: Paambuthaara (Tamil), Pamubatu (Telugu), Cherakozhi (Malayalam), Panwa (Hindi).

Size: 90cm.

Field characters: A waterbird with a very long, slender, snakelike neck, and a long, pointed bill. Breeding adults have a shiny black body with silvery-white streaks along the wings, a brownish crown and neck, and a white stripe running from the eye to the side of the neck. Nonbreeding and immature plumage is duller and browner. Frequently seen swimming with only its neck and head visible above the water. Impales fish underwater with its daggerlike bill. Like cormorants, often perches upright on a rock, drying itself with outstretched wings. Seen singly or in small groups in inland or coastal water bodies.

Distribution: Throughout the Indian Union

Food: Fish.

Call: Usually silent.

Nesting: Season- November to February in South India. Eggs: 3 to 4, elongated, pale greenish blue.

Pavo cristatus (Linnaeus,1758)

Indian Peafowl

Local names: Mayil (Tamil,Malayalam), Nemali (Telugu), Navilu (Kannada), Mor Mayura (Hindi).

Size: 92-122cm.

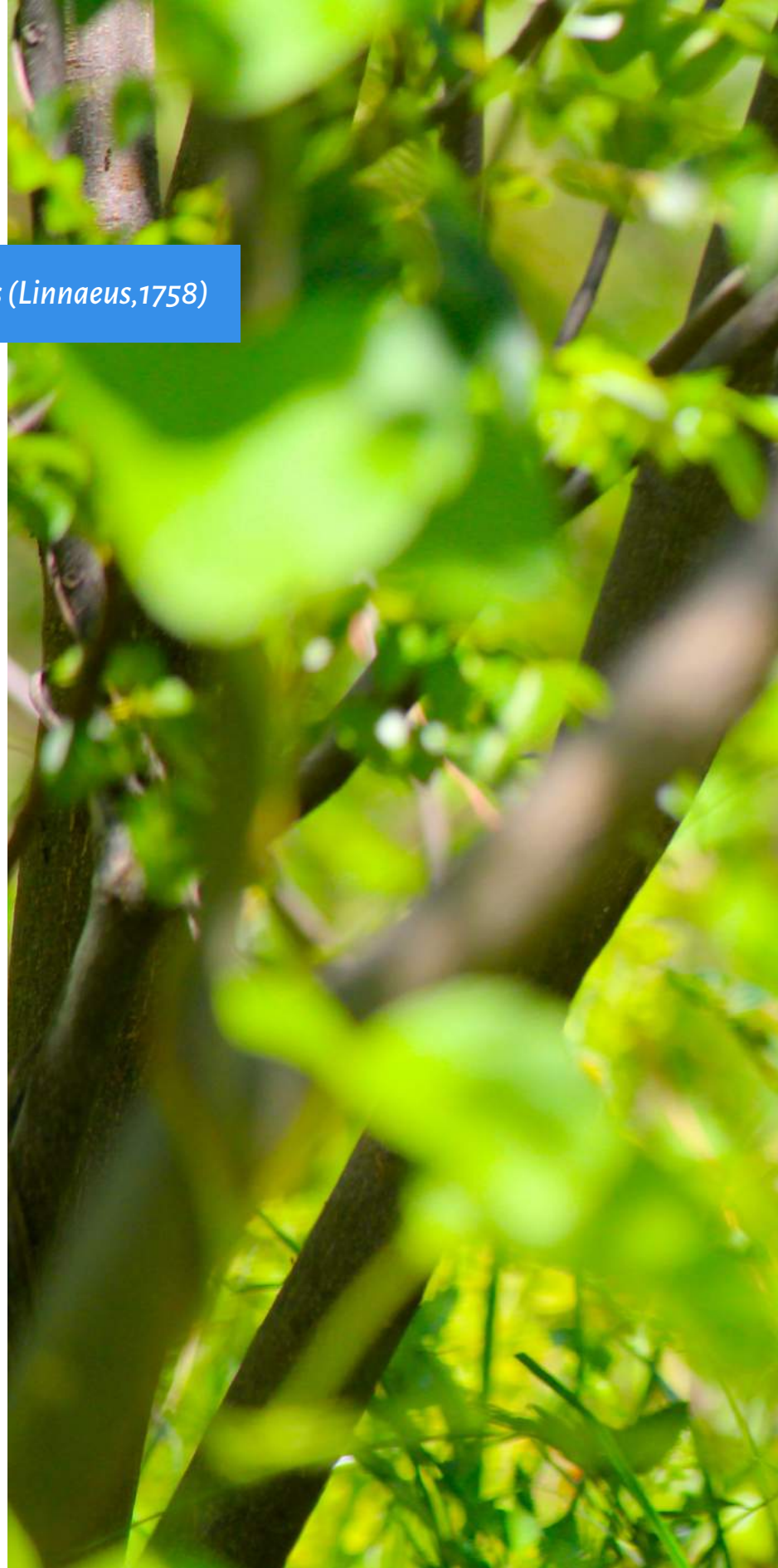
Field characters: An unmistakable, large ground bird. The unmistakable iridescent blue male spreads out its ornamental upper tail feathers when courting females. Females have a shorter tail, an iridescent green neck, and browner plumage. Found in forest, forest edge, and agricultural land. Often seen on paths or alertly feeding in the undergrowth. Can be fairly confiding especially when found close to human habitation. Excessively shy and alert.

Distribution: Throughout the Indian Union.

Food: Grain, vegetable shoots, insects, lizards, snakes, etc.

Call: A loud harsh, screaming may-awe, and short gasping shrieks “ka-ann”.

Nesting: Season- January to October. Eggs: 3 to5, glossy pale cream. ■



Francolinus pondicerianus (J. F. Gmelin, 1789)

Grey Francolin

Local names: Kauthari (Tamil, Malayalam), Safed teetar (Hindi).

Size: Half-grown domestic hen.

Field characters: A small gamebird with an orangish face and fine barring throughout. Males and females are similar. Occurs in open grassy areas such as dry grasslands, scrub, and agricultural land. Often found in pairs or coveys.

Distribution: The drier portions of the entire Indian Union (except NE. states).

Food: Coveys scratch the ground or cattle dung for food; grain, seeds, termites, beetle larvae, etc.

Call: A ringing, high-pitched, musical kateetar kateetar or pateela pateela.

Nesting: Season- practically all year, varying locally. ■

Elanus caeruleus (Desfontaines,1789)

Black-winged Kite

Local names: Karundhol parundhu (Tamil), Velli eriyan (Malayalam), Adavi ramadasu (Telugu), Kapassi (Hindi).

Size: 33cm.

Field character: Small and distinctive Falcon-like kite. Light underneath, blue-gray above with conspicuous black shoulders formed by black wing coverts. Juveniles have a scaly back and brownish-washed breast. Found in open savannah, semi-desert, and agricultural lands with scattered woods.

Distribution: Patchily throughout the Indian Union. Resident and locally migratory.

Food: Locusts, crickets, mice, lizards, etc.

Call: A shrill squeal, seldom heard.

Nesting: Season- practically all year. Eggs: 3 or 4, yellowish white, densely blotched with brownish red. ■

Columba livia (J. F. Gmelin, 1789)

Rock Pigeon

Local names: Maadapura (Tamil), Maadapraavu (Malayalam), Gudi pavrai (Telugu), Paarivala (Kannada), Kabutar (Hindi).

Size: 33cm.

Field characters: Large dove common in cities, farmland, and on grain elevators around the world. Wild birds often nest on cliffs, while the feral variety has readily adapted to nest on tall structures including skyscrapers and bridges. Wide array of feral and domestic color varieties; most are gray but can be completely black, white, or orangey-brown. Sexes look alike. Found in flocks and colonies.

Distribution: Throughout the Indian Union.

Food: Cereals, Pulses, Groundnuts, etc.

Call: A deep gootr-goo gootr-goo.

Nesting: Season- undefined; practically all year in semi-feral birds. Egg: 2,white, elliptical. ■

Streptopelia decaocto (Frivaldszky, 1838)

Eurasian Collared Dove

Local names: Saambal pura (Tamil), Pottan chengali (Malayalam), Pedda bella guwa (Telugu), Dhor fakhta (Hindi).

Size: 32 cm.

Field characters: Smaller than Rock Pigeon. Body is uniformly chalky-beige. Black crescent on nape. Paler overall with a square-tipped tail. Favors farms and suburbs; avoids areas with extensive forests. Sexes alike. Found in pairs or loose flocks.

Distribution: Throughout the drier portions of the Indian Union.

Food: Seeds, grains.

Call: A deep trysyllabic “kuk-koo-kook”.

Nesting: Season- practically all year. Egg: 2, white. ■

Cypsiurus balasiensis (J.E. Gray, 1829)

Asian Palm Swift

Local names: Panai uzhavaaran (Tamil), Panampakshi (Malayalam), Panahakki (Kannada), Tadi ababeel (Hindi).

Size: 13cm.

Field characters: A small gray-brown swift with long thin wings and a long heavily-forked tail. It has medium gray upperparts and pale gray underparts without any trace of white. Can be seen in rapid fluttering flight. Mostly a bird of the plains, but partial to areas with palms on which they breed. Sexes alike. Seen in pairs or loose flocks.

Distribution: Practically throughout the Indian Union, coincident with the range of the palmyra palm (Borassus flabellifer).

Food: Insects.

Call: A shrill joyous triple note ti-ti-tee.

Nesting: Season- Undefined,varying locally. Eggs: 2-3,pure white,long pointed ovals. ■

Centropus sinensis (Stephens, 1815)

Greater Coucal

Local names: Sembagam (Tamil), Chemboth (Malayalam), Chemara kaki (Telugu), Mahoka (Hindi).

Size: 48cm.

Field characters: A large bird that resembles a cross between a crow and a pheasant. Largely black with distinctive rusty wings, glossy underparts, a long and heavy black tail, and deep red eyes. Juveniles are much duller with white bars on the tail and underparts and variable amounts of black streaks on the wings and upperparts. Common across a range of habitats except very dense forests. Similar to Lesser Coucal, but Greater Coucal is larger with a longer bill and red eyes. Adult Greater Coucals also lack the white streaks on the wings seen on Lesser Coucal. Sexes alike. Found singles or pairs.

Distribution: Throughout Indian Union.

Food: Caterpillars, insects, snails, lizards, young mice, bird's eggs.

Call: A deep resonant coop-coop-coop.

Nesting: Season- February to September, varying locally. Eggs: 3-4, chalky glossless white. ■

Clamator jacobinus (Boddaert, 1783)

Pied Crested Cuckoo

Local names: Sudalai kuyil, Kondai kuyil (Tamil), komban kuyil (Malayalam), Chataka pakshi (Telugu), Chataka (Kannada), Chatak (Hindi).

Size: 33cm.

Field characters: Crested black and white cuckoo. White tips of tail feathers, and a roundish patch on wings conspicuous in flight. Found single or as pairs in thorny bushes or trees.

Distribution: Practically the entire Indian Union.

Food: Insects and berries.

Call: Metallic piu-piu-pee-pee-piu-pee-pee-piu.

Nesting: Season- chiefly June to August, coinciding locally with the breeding of its accustomed hosts. Parasitic chiefly on babblers of the Turdoides group. Eggs: Blue, similar to those of the fosterers. ■

Cacomantis passerinus (Vahl, 1797)

Grey-bellied Cuckoo

Local names: Saambal vayitru kuyil (Tamil), Cherukuyil (Malayalam), Chinna katte pitta (Telugu), Chote papeeha (Hindi).

Size: 23cm.

Field characters: A slim arboreal bird, dark grey above, whitish below with grey chin and throat. White tipped black tail, and a white patch on underside of black wings prominent in flight.

Distribution: Practically throughout Indian Union.

Food: Plant bugs, caterpillars, insects.

Call: Normally a high pitched p'teer p'teer p'teer. Also a pleasant, plaintive whistling song pi-pi-pipeepeepi-pipeepee.

Nesting: Season- July to September. Parasitic chiefly on Tailorbirds and Ashy Prinias, its eggs matching theirs in coloration and markings in varying degree.■

Eudynamys scolopaceus (Linnaeus,1758)

Asian Koel

Local names: Kuyil (Tamil), Kakkakuyil (Malayalam), Poda kovela-female (Telugu), Koel (Hindi), Kogile (Kannada).

Size: 43cm.

Field characters: An unmistakable, sexually dimorphic, long-tailed cuckoo. The male is glossy-black with a pale bill while the female is dark brown above with white bars and spots, barred underparts, and a strongly speckled throat. Present in all types of habitats except dense forests. Mostly solitary, sometimes seen in pairs, and is well known for parasitising the nests of crows. Races differ mainly in the plumage of the females and the amount of gloss on the males.

Distribution: The entire Indian Union.

Food: Fruits and berries. Also caterpillars and insects.

Call: Known for the distinctive "ko-el" song of the male. Calls include a "kow-kow-kow-kow" call of the male and the shrieking "kik-kik-kik-kik" call of the female.

Nesting: Season- mainly April to August, coincident with that of its normal hosts (House and Jungle crows). Eggs: Similar but smaller to crows'; pale greyish green or stone colour, speckled and blotched with reddish brown.■

Amaurornis phoenicurus (Pennant, 1769)

White-breasted Waterhen

Local names: Venmarbu kaanangozhi, Sambukozhi (Tamil), Kula kozhi (Malayalam), Buda kodi (Telugu), Hundu koli (Kannada), Dauk (Hindi).

Size: 32cm.

Field characters: A shy bird with long legs, a slaty-gray back, a white face and breast, and a stubby tail, which is often jerked up, flashing a chestnut vent. Seen around the edges of ponds and lakes and in reeds and thickets in marshy areas, stalking prey or skulking in the undergrowth. Can be seen far from water. Sexes alike. Found in pairs or singles.

Distribution: Throughout the Indian Union.

Food: Insects, worms, molluscs, grain and shoot of paddy and marsh plants.

Call: Very noisy during its breeding season which coincides with the rains, emitting loud croaks and chuckles, and a metallic krr-kwak-kwak.

Nesting: Season- June to October. Eggs: 6 to 7, cream or pinkish white, streaked and blotched with reddish brown.

Porphyrio porphyrio (Linnaeus, 1758)

Purple Swamphen

Local names: Neela thaazhaikozhi (Tamil), Neelakozhi (Malayalam), Nila bolli kodi (Telugu), Kaim, Kharim, Khima (Hindi).

Size: 43cm.

Field characters: Favors fresh marshes. Clambers among tall reeds and rushes in fresh marshes; also feeds at edges, even out in adjacent wet fields. Deep purplish blue overall with very stout red bill and reddish legs, white undertail patch. Juvenile duller overall, mostly grayish. Sexes alike. Found in pairs or parties.

Distribution: Throughout the plains of the Indian Union.

Food: Shoots and vegetable matter, also insects and molluscs.

Call: A variety of loud hooting, cackling and hoarse voice.

Nesting: Season- June to September. Eggs: 3 to 7, pale yellowish stone to reddish buff, blotched and spotted with reddish brown.

Milvus migrans (Boddaert, 1783)

Black Kite

Local names:Karumparundhu (Tamil), Chakki parundhu (Malayalam), Haddu, Giduga (Kannada), Cheel (Hindi).

Size: 61cm.

Field characters: Medium-sized, rather nondescript raptor with overall dark plumage. Slightly forked tail less, the fork disappearing when the tail is fully open. Head and neck are short. The juvenile is paler with a pale panel on upperwings and a dark mask around the eyes. Flight style buoyant, gliding and changing direction with ease. Commonly found in urban areas, rubbish dumps, aquatic habitats, grassland, but usually avoids heavily forested areas. May be found solitarily but also in large flocks on migration and at good feeding areas. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Offal and garbage, earthworms, winged termites, lizards, mice, disabled or young birds, and almost anything else that can be procured.

Call: A shrill almost musical whistling ewe-wir-wir-wir.

Nesting: Season- December to February.

Eggs: 2 or 4, dirty pinkish white, lightly spotted and blotched with reddish brown.

Gallinula chloropus (Linnaeus, 1758)

Common Moorhen

Local names: Thaazhai kozhi (Tamil), Pattakozhi (Malayalam), Bolli kodi (Telugu), Kali jal murghi (Hindi).

Size: 32cm.

Field characters: Common in fresh and brackish marshes, on ponds, lakes, and along slow-moving watercourses with bordering vegetation. Swims with jerky motion and walks with stealthy gait, the tail often slightly cocked; does not usually dive. Big white oval patches under tail and white streaks along flanks. Adult has red bill with yellow tip; immature has duller bill and legs.

Distribution: Throughout the Indian Union.

Food: As White-breasted Waterhen.

Call: A sharp loud and abrupt kirrik-crek-rek-rek.

Nesting: Season- June to September. Eggs: 5 to 12, pale yellowish to warm buff stone colour, blotched with dark reddish brown.

Ixobrychus sinensis (J. F. Gmelin, 1789)

Yellow Bittern

Local names: Manjal kurugu (Tamil), Manjakokku (Malayalam), Jun bagla (Hindi).

Size: 38cm.

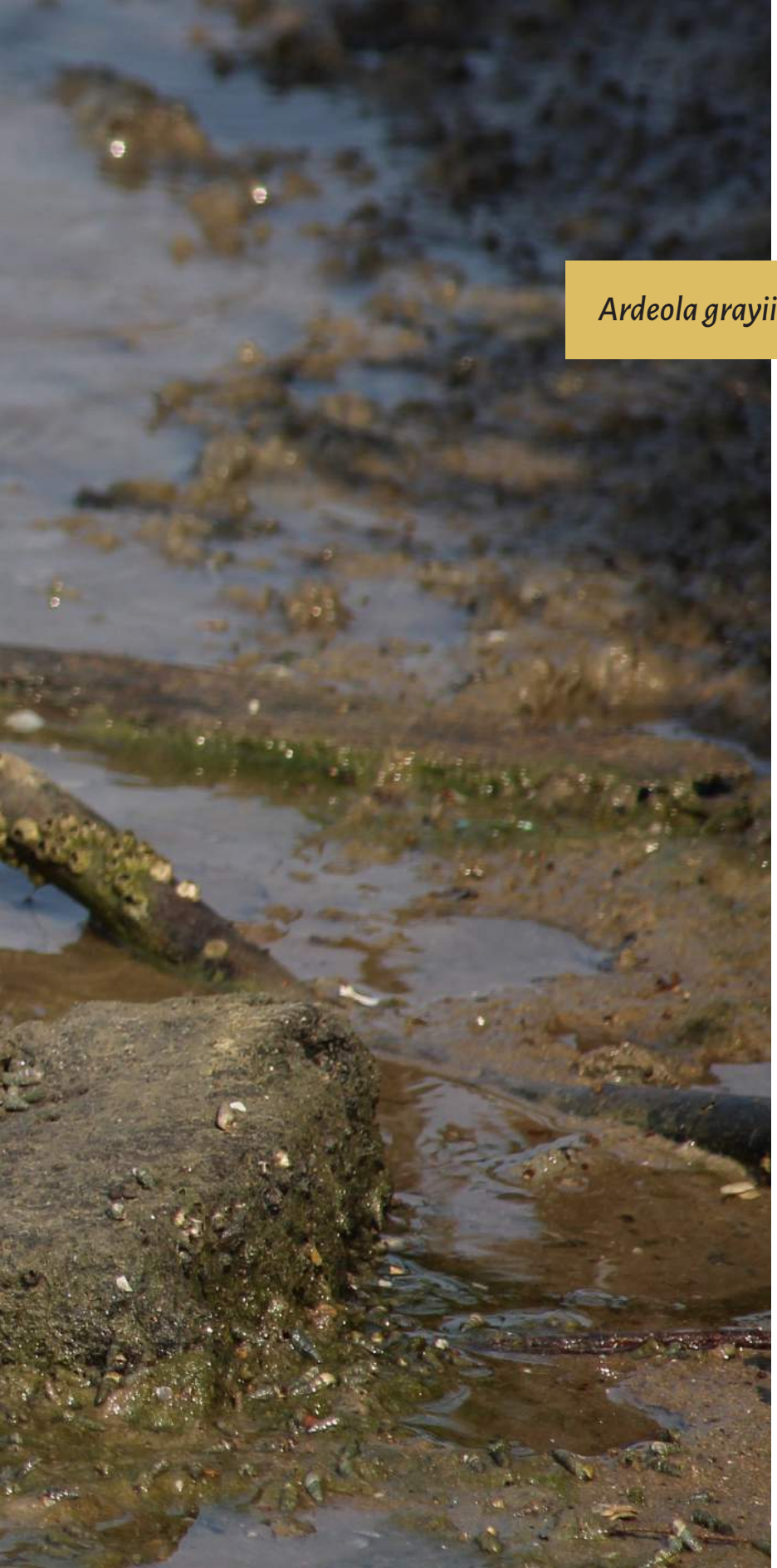
Field characters: A skulky reedbed dweller that rarely comes out of cover. Identified by yellowish buff upperparts that contrast with dark brown flight feathers. Both sexes have a black crown although females also have rufous streaking on the crown. Juveniles are buffy with brown streaking on the underparts and wing coverts. Generally solitary and more active at dawn and dusk. Often seen flying low over reedbeds with slow wingbeats. When in danger, they freeze and point their head and neck upwards, blending with their surrounding.

Distribution: Resident throughout India.

Food: Fish, frogs, molluscs.

Call: Hoarse.

Nesting: Season- June to September. Eggs: 4 to 6, pale blue or greenish blue. ■



Ardeola grayii (Sykes,1832)

Indian Pond Heron

Local names: Madayaan (Tamil), Kulamuti(Malayalam), Guddi konga (Telugu), Bagla (Hindi).

Size: 46cm.

Field characters: A small heron that is common in most aquatic habitats across the Indian subcontinent. Adults in breeding plumage have a dark reddish brown back that contrasts with a yellowish head, neck, and breast. In flight, adults appear surprisingly white due to their strikingly white wings, underparts, and tail. Although typically solitary, large numbers often gather where food is plentiful. Prone to seasonally local movements and vagrancy. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Frogs, fish, crab, insects.

Call: A harsh croak uttered when flying off.

Nesting: Season- Chiefly May to September. November to January in South India. Eggs: 3 to 5, pale greenish blue. ■

Bubulcus ibis (Linnaeus, 1758)

Cattle Egret

Local names: Unnikokku (Tamil), Kalimundi (Malayalam), Samti konga (Telugu), Govakki (Kannada), Surkhia bagla (Hindi).

Size: 51cm.

Field characters: Small, compact, white heron with stout yellow bill. Often seen on dry land. Legs red or yellow during the breeding season, black during nonbreeding season. Breeding birds have redder bills and creamy patches on body. Often feeds by following cattle or tractors in fields. Sexes alike. Found in parties, attending on grazing cattle.

Distribution: Throughout the Indian Union.
Food: Grasshoppers, bluebottle flies, cicadas and other insects, frogs, lizards, fish. Banyan capsules avidly gulped down in season.

Call: =A hoarse 'k'a-k'a' .

Nesting: Season- November to March in South India, varying according to monsoon conditions.

Eggs: 3 to 5, pale skim-milk blue. ■

Ardea purpurea (Linnaeus, 1766)

Purple Heron

Local names: Senneela kokku (Tamil), Perumundi, Chaayamundi (Malayalam), Kenneeli baka (Kannada), Lal anjan (Hindi).

Size: 97cm. standing-70cm.

Field characters: Large heron with rusty head and streaky neck; juvenile is extensively rusty brown on upperparts. Bright purple in direct sunlight. Favors fresh marshes with tall reeds and other vegetation, rarely seen in open situations.

Distribution: Resident and local migratory throughout Indian subcontinent, Andaman and Nicobar.

Food: Fish, frogs, snakes.

Call: Loud and hoarse.

Nesting: Season- June to March, depending on locality. Eggs: 3 to 5, pale sea green or greenish blue. ■

Ardea intermedia (Wagler, 1829)

Intermediate Egret

Local names: Ven kokku (Tamil), Cherumundi (Malayalam), Tella konga (Telugu), Karchia bagla (Hindi).

Size: 80cm.

Field characters: A stocky egret that is larger than Cattle and Little Egrets, but smaller than the Great Egret. Often confusing and difficult to identify, this bird is truly intermediate between potential confusion species. Things to look for include a yellow bill that is shorter than Great Egret but longer than Cattle Egret, a relatively rounded head, and shorter legs than Great Egret, approaching Cattle Egret. these birds can be distinguished from Little Egret by their completely black feet and shorter bills. Like most egret species, associates with all types of water bodies including wet fields and usually flocks with other egrets.

Distribution: Resident throughout the plains of Indian subcontinent.

Food: Fish, frogs.

Call: Loud and hoarse.

Nesting: Season- July to February, depending on locality. Eggs: 3 to 4, pale green. ■

Microcarbo niger (Vieillot,1817)

Little Cormorant

Local names: Chinna Neerkagam (Tamil), Cheriya Neerkaakka (Malayalam), Neetikaki (Telugu), Putta Neeru kaage (Kannada), Chota pankowwa (Hindi).

Size: 51cm.

Field characters: An all black ducklike waterbird with a distinctive flattish head and a bill that is sharply hooked at the tip. Smallest of the cormorants found in the region. Breeding adults have white plumes on the sides of the head. Like all cormorants, frequently seen swimming with its body low in the water, head and neck pointing upward, and suddenly disappearing under-water to catch fish. Often perches upright on a rock, drying itself with outstretched wings. Seen singly or in small groups in inland water bodies.

Distribution: Throughout the Indian Union.

Food: Fish.

Nesting: Season- November to February in South India. Eggs: 4 to 5, pale bluish green, with a chalky surface. ■

Himantopus himantopus (Linnaeus, 1758)

Black-winged Stilt

Local names: Pavilkkaal ullaan (Tamil), Pavizhakkaali (Malayalam), Tinghur (Hindi)

Size: 25cm.

Field characters: Fairly common to locally common in warmer regions. Favors wetlands with open shallow water, often brackish; breeds on bare ground near water, often in noisy colonies. Striking and essentially unmistakable, with elegant shape, boldly pied plumage, long hot-pink legs, and long, very fine bill. Feeds by wading in water, picking with its bill from the water surface. In flight, long pink legs stick out far beyond tail. The sexes differ in details of coloration, as also the summer and winter plumages. Found in pairs or flocks.

Distribution: Resident or locally migratory in Indian Union.

Food: Worms, molluscs, aquatic insects.

Nesting: Season- Principally April to August. Eggs: 3 to 4, light drab in colour, densely blotched with black; closely resembling eggs of Red-wattled Lapwing.

Call: A squeaky, piping chek-chek-chek. ■

Vanellus indicus (Boddaert,1783)

Red-wattled Lapwing

Local names: Aalkaatti (Tamil), Chenganni (Malayalam), Kentittibha (Kannada), Yennapa chitawa (Telugu), Titori (Hindi).

Size: 33cm.

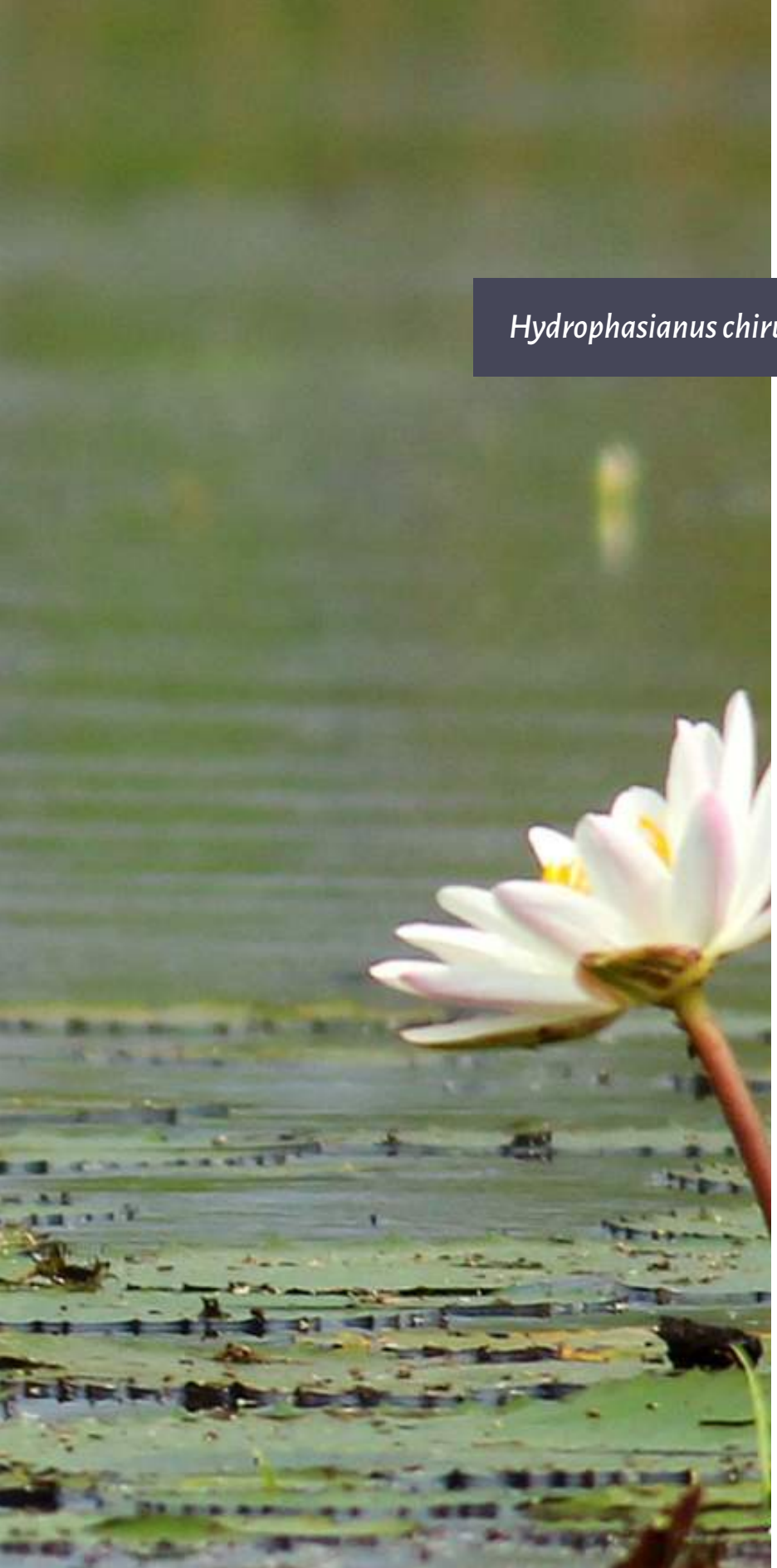
Field characters: A distinctly marked lapwing with a black breast and throat and a red bill with a black tip. It also sports red wattles in front of the eyes and a white patch that runs down the cheeks to the underparts. In flight, note the black flight feathers that contrast with the white wing patch. Usually found in small groups around water bodies, agricultural fields, and dry land. They feed primarily on insects, catching them in a typical plover like manner, running a short distance and picking up food from ground. A bird known for its characteristics loud alarm call, often compared to the words “Did we do it?”. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Insects, grubs, molluscs, etc.

Call: A loud, penetrating ti-ti-tweet

Nesting: Season- March to August. Eggs: 4, Stone colour or greyish brown, blotched with blackish; peg-top shaped. ■



Hydrophasianus chirurgus (Scopoli, 1786)

Pheasant-tailed Jacana

Local names: Neelavaal ilaikozhi (Tamil), Thaamarakozhi (Malayalam), Piho (Hindi).

Size: 31cm.

Field character: In breeding dress, identified in flight by the large amount of white and chocolate-brown plumage, and the pointed downcurved tailed. Non-breeding birds chiefly pale brown and white, with a black 'necklace' on upper breast and sickle shaped 'pheasant' tail. Sexes alike. Found as singles or groups in vegetation- covered jheels. Distribution: Throughout the Indian Union. Food: Vegetable matter, aquatic insects, molluscs, etc.

Call: A peculiar nasal mewing tewn,tewn

Nesting: Season- June to September. Eggs: 4, pep-top shaped, glossy greenish bronze or rufous-brown, unmarked.

Haliastur indus (Boddaert, 1783)

Brahminy Kite

Local names: semparundhu (Tamil), Krishna Parundhu (Malayalam), Garuda mantaru (Telugu), Bili Garuda (Kannada), Brahmani cheel (Hindi).

Size: 48cm.

Field characters: A medium-sized raptor with a rounded tail unlike other kites. Adults are unmistakable with a white head and breast contrasting with otherwise brick brown plumage. Juveniles are a darker brownish-black with a paler head and prominent white patches under the wings. Usually associated with both inland and coastal wetlands in tropical Asia. Sexes alike.

Distribution: Throughout Indian Union. Resident and locally migratory.

Food: Offal, fish, frogs, small snakes, bats, etc.

Call: Distinctive nasal, drawn out, "Kyeeerrh."

Nesting: Season- principally December to April. Eggs: 2, greyish white, speckled and blotched with dingy reddish brown. ■

Upupa epops (Linnaeus, 1758)

Common Hoopoe

Local names:Kondalaathi (Tamil), Uppooppan (Malayalam), Kukudu guwa (Telugu), Chandra mukuta (Kannada), Hudhud (Hindi).

Size: 31cm.

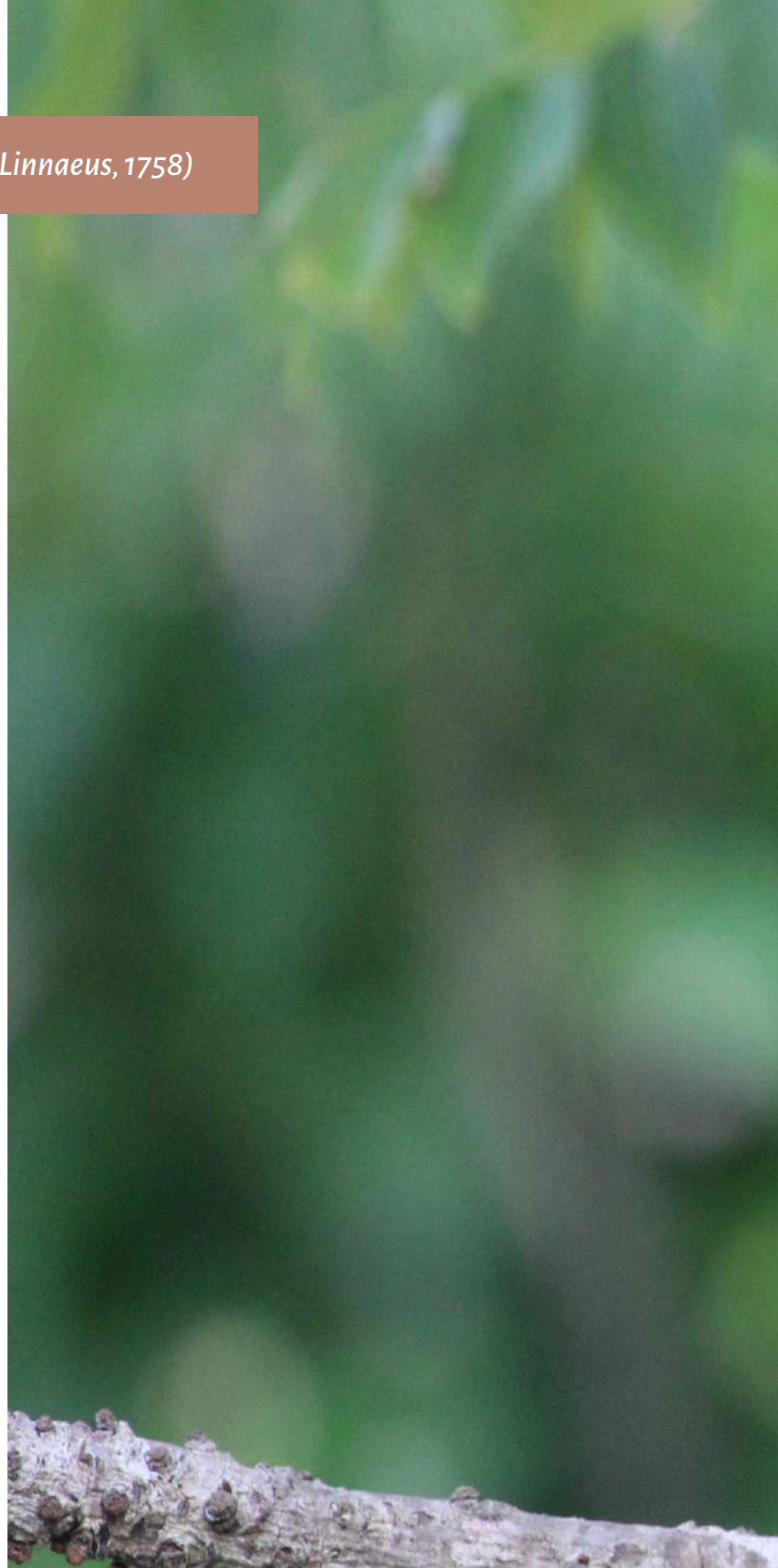
Field characters: Utterly unmistakable orange bird with a zebra-striped wings, a Chinese fan of a crest (usually held closed, but often raised just after landing), and a rapier of a bill. Favors semi-open habitats such as heathland, farmland, orchards, grassy lawns, where it feeds on the ground, probing with its long bill for insects. Flight fast and fairly direct, with rather deep wingbeats. Unlikely to be confused, but flight pattern and round wings may loosely resemble that of woodpeckers; note far longer and thinner bill. Sexes alike. Found in pairs or singles.

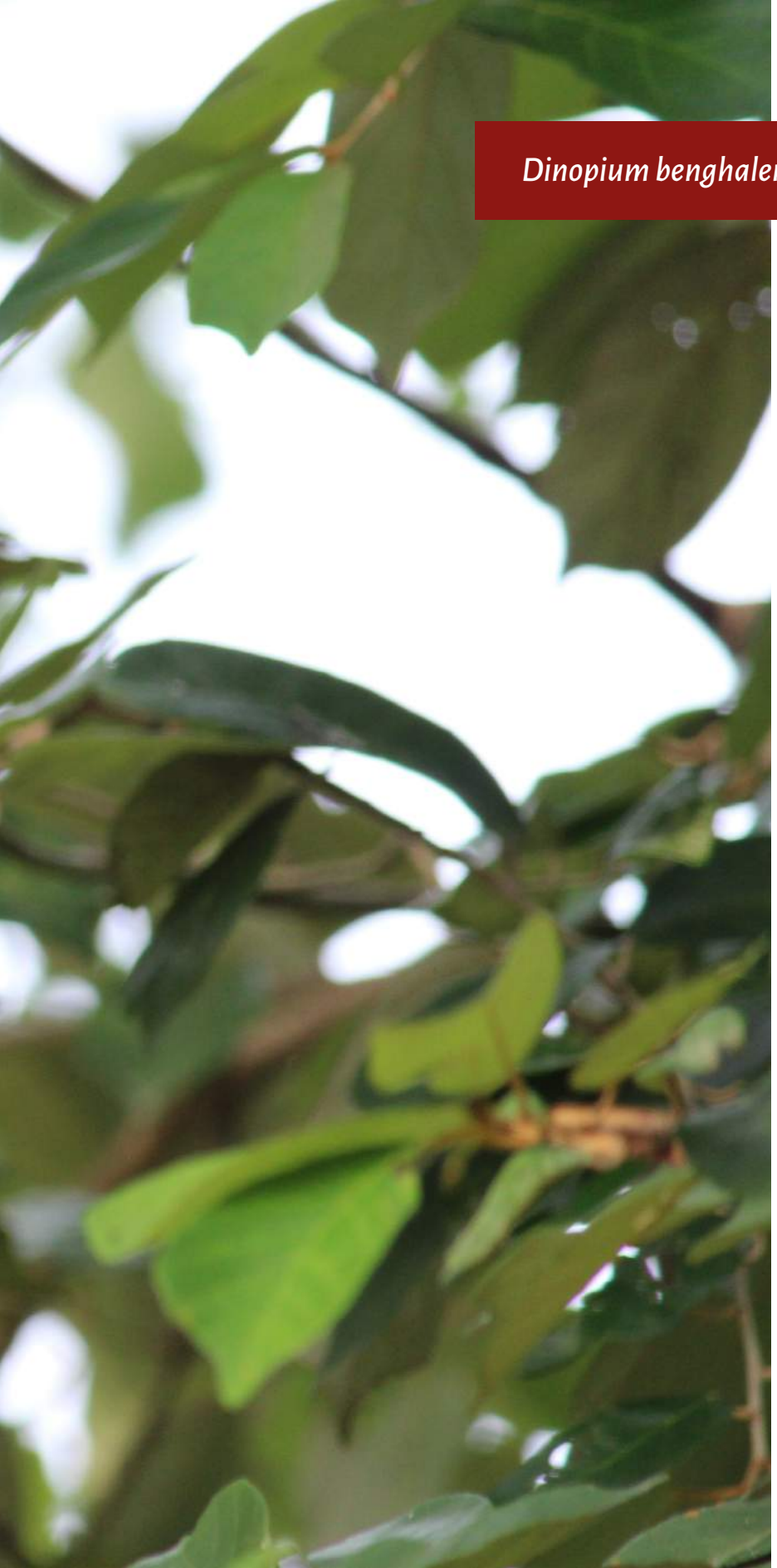
Distribution: Practically throughout the Indian Union. Resident and locally migratory.

Food: insects, grubs, pupae; hence its beneficial to agriculture.

Call: A soft, musical, penetrating, hoo-po,hoo-po-po.

Nesting: Season- principally February to May. Eggs: 5 or 6, white.





Dinopium benghalense (Linnaeus,1758)

Lesser Golden-backed Woodpecker

(Black-rumped flameback woodpecker)

Local names: Ponmudhugu marangothi (Tamil), Naatumarangothi (Malayalam), Vadrangi pitta (Telugu), Suvarna bennina marakutika (Kannada).

Size: 29cm.

Field characters: A common, "small-billed" golden-backed woodpecker with four toes. Endemic to the Indian subcontinent and Sri Lanka. Associated with every lowland wooded habitat except dense tropical forest, it often follows degradation into higher elevations. Only flameback where both sexes have red on the crown, but the red on females is restricted to the hind crown. A dark throat and the lack of a contrasting black horizontal stripe below the cheek allow easy separation from other flamebacks.

Distribution: Practically the entire Indian Union.

Food: beetles, insects, black ants, also, pulp of ripe fruit and nectar.

Call: loud "ki-ki-ki-ki-ki"

Nesting: Season- March to August. Eggs: 3, glossy white.■

Turdoides striata (Dumont,1823)

Jungle Babbler

Local names: Kaattu silamban, Thavittu kuruvi, Kal kuruvi (Tamil), Kariyila kili (Malayalam), Sat bhai (Hindi).

Size: 25cm.

Field characters: This familiar ash-brown colored babbler has a yellow bill and a dark brow in front of the eye that contrasts with its pale eye giving it a perpetual "angry" look. It has vague streaking on the upperparts, diffuse mottling on its throat, and barring on its tail. The multiple races vary slightly in color. They are often seen in noisy flocks hopping on the ground and flicking litter in search of food.

Distribution: Throughout the Indian Union.

Food: Spiders, cockroaches and other insects, larvae, wild figs, berries, grain, nectar of some flowers.

Call: A sharp kli-kli-kli-kli.

Nesting: Season- irregularly throughout the year. Egg: 3 or 4, turquoise blue.

Pastor roseus (Linnaeus, 1758)

Rosy Starling

Local names: Sooraikkuruvi (Tamil), Pandhikaali (Malayalam), Palisa (Telugu), Gulabi myna (Hindi).

Size: 23cm.

Field characters: A rose-pink myna-like bird with glistening black head, neck and upper breast, wings and tail. A long, recumbent, pointed crest on crown and nape, sometimes erected. Sexes alike. Found in flocks near cultivated areas.

Distribution: In winter, all over India.

Food: Banyan and peepal figs, berries and nectars of some plants.

Call: A sharp and loud ki-ki-kli-ki-ki-kli.

Nesting: Season- May and June (in western and central Asia).

Lonchura punctulata (Linnaeus, 1758)

Scaly-breasted Munia

Local names: Pulli sillai (Tamil), Chuttiatta (Malayalam), Kakkara jinuwayi (Telugu), Seenabaz (Hindi).

Size: 10cm.

Field characters: Small, finchlike bird of weedy and grassy areas in tropical lowlands. Often in small flocks, which associate readily with birds. Adult is handsome and striking, with rusty brown head and breast, and white underparts with bold black scaly markings. Juvenile notably plain, buffy brown overall with stout, dark gray bill. Note the pointed tail, unlike seedeaters and grassquits. Native to Asia and spreading in New World as an escaped cagebird. Sexes alike.

Distribution: All over India

Food: grass, seeds, winged termites.

Call: A sharp twee-tweee

Nesting: Season- chiefly July to October. Eggs: 4 to 8, pure white. ■

Merops orientalis (Latham, 1801)

Green Bee Eater

Local names:Pachai panjuruttaan (Tamil), Naatuvelithaththa (Malayalam), Chinna passeriki (Telugu), Patringa (Hindi).

Size: 21cm.

Field characters: A small dainty bee-eater that is intensely green overall with a greenish-blue throat, a thin black throat band, and long central tail feathers. In flight, note the dark edge along the lower border of the wings. Juveniles are duller than adults and lack the long tail feathers. In some parts of its range, birds may have a rusty crown or a bright blue throat. Flies gracefully as it catches insects and other prey. Common in open woodlands, fields, farmlands, and around sparse human habitation. Some populations show seasonal movements. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Insects, chiefly diptera and hymnoptera.

Call: A pleasant jingling tit,tit or trilly tree-tree-tree.

Nesting: Season- principally February to May. Eggs: 4 to 7, pure white, roundish oval. ■

Ceryle rudis (Linnaeus,1758)

Pied Kingfisher

Local names: Karuppuvellai meenkothi (Tamil), Pulli meenkothi (Malayalam), Kaibili minchulli (Kannada), Koryala, Kilkila (Hindi).

Size: 31cm.

Field characters: A distinctive medium-sized kingfisher with black-and-white plumage and a speckled body. It has a black crown and crest, white underparts, and black upperparts with white edgings giving a speckled appearance. It feeds exclusively by hovering over water and plunging down to catch its prey, making it easy to spot and identify. Males have two prominent breast bands while females have only one, which is less prominent. Juveniles look like females, but have brown fringes to its feathers. Inhabits all kinds of water bodies with patches of open water without floating vegetation, but avoids small streams and other smaller water bodies in the mountains.

Distribution: Throughout the plains of India.

Food: Fish, frogs, tadpoles, aquatic insects.

Call: A sharp, cheery chirruk chirruk.

Nesting: Season- between October and May. Eggs: 5 or 6, glossy white roundish ovals.

Alcedo atthis (Linnaeus, 1758)

Common Kingfisher

Local names: Siruneela meenkothi (Tamil), Cheriya meenkothi (Malayalam), Chota kilkila (Hindi).

Size: 18cm.

Field characters: Fairly common but small, often rather shy, and inconspicuous. Found along rivers, streams, at lakes and ponds—almost any fresh or brackish habitat with small fish. Often perches quietly in trees over water; most often seen in very fast low flight as a turquoise flash over the water, usually flying away. Beautiful blue-and-orange plumage, in combination with habitat and habits, is basically unmistakable. Easily detected once its high, shrill whistled call is learned, even if the bird itself is hidden. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Small fish, tadpoles, aquatic insects.

Call: A sharp chichee,chichee.

Nesting: Season- principally March to June. Eggs: 5 to7, pure white, glossy, roundish oval.

Psittacula krameri (Scopoli,1769)

Rose-ringed Parakeet

Local names: Sivappu aarakkili (Tamil), Naa-tuthaththa (Malayalam), Chiluka (Telugu), Tota (Hindi).

Size: 42cm.

Field characters: Vibrantly bright green parakeet, frequently found in woodland, parks, gardens, where feeds mainly in trees. Nests in cavities, including holes in buildings. Easily overlooked if quiet, as the bright green plumage blends easily with foliage. Note the very long slender tail, bright red bill; male has narrow black-and-rose neck ring. Like other parakeets, raucous and social, often appearing in noisy groups, found near cultivation areas.

Distribution: Practically the entire Indian Union.

Food: Fruits, grains.

Call: A loud, sharp screaming, keeak keeak keeak.

Nesting: Season- February to April. Eggs: 4 to 6, pure white, roundish oval.

Halcyon smyrnensis (Linnaeus, 1758)

White-throated Kingfisher

Local names: Meenkothi (Tamil, Malayalam), Buchegadu (Telugu), Minchulli (Kannada), Kilkila (Hindi).

Size: 28cm.

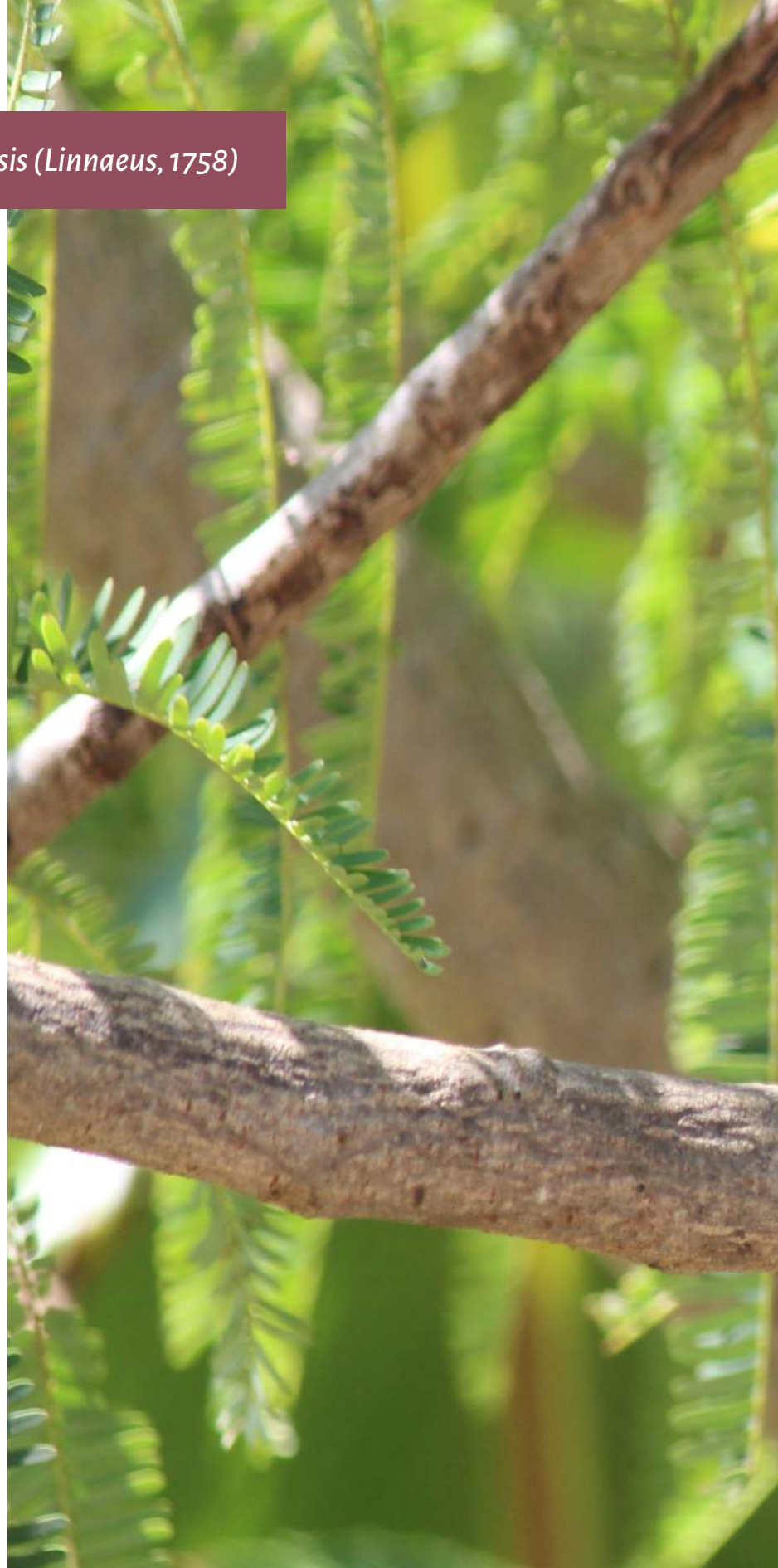
Field characters: A widespread medium-sized kingfisher with brilliant turquoise wings, back, and tail that contrast with its dark chocolate head and sides. From the front the namesake white throat stands out. In flight, it shows a prominent white patch at base of black flight feathers. Females are slightly paler on the head and belly than males. Juveniles have a duller breast with fine dark scallops. This kingfisher is not tied to water and occupies all kinds of habitats including gardens, parks, homesteads, and woodlands.

Distribution: Plains and lower hills throughout the Indian Union.

Food: Fish, tadpoles, lizards, grasshoppers, other insects.

Call: The song is a loud ringing "kilililili" while its regular call, mostly uttered in flight, is a loud chattering "kra-kra-kra-kra-kra" laugh.

Nesting: Season- principally March to July. Eggs: 4 to7, white, spherical.



Tephrodornis sylvicola (Jerdon, 1839)

Malabar Woodshrike

Local names: Malabar kaatukeechan (Tamil), Malabar asurattan (Malayalam).

Size: 18cm.

Field characters: Large, dark woodshrike with broad dark mask, no pale supercilium, white rump and dark tail; adult has dark grey-brown upperparts and browner remiges. Found in Edges and clearings within evergreen forests. Usually occurs in pairs or small groups of up to 5–10 individuals; often associates with mixed-species.

Distribution: It is endemic to Western ghats, visits the plains.

Food: Insects and grubs

Call: Slow paced ker-ker-ker.

Nesting: Season- January to April (Kerala). Eggs: 3, white.

Oriolus oriolus (Linnaeus, 1758)

Eurasian Golden Oriole

Local names: Maanguyil (Tamil), Mangnakkili (Malayalam), Vanga pandu (Telugu), Peelak (Hindi).

Size: 25cm.

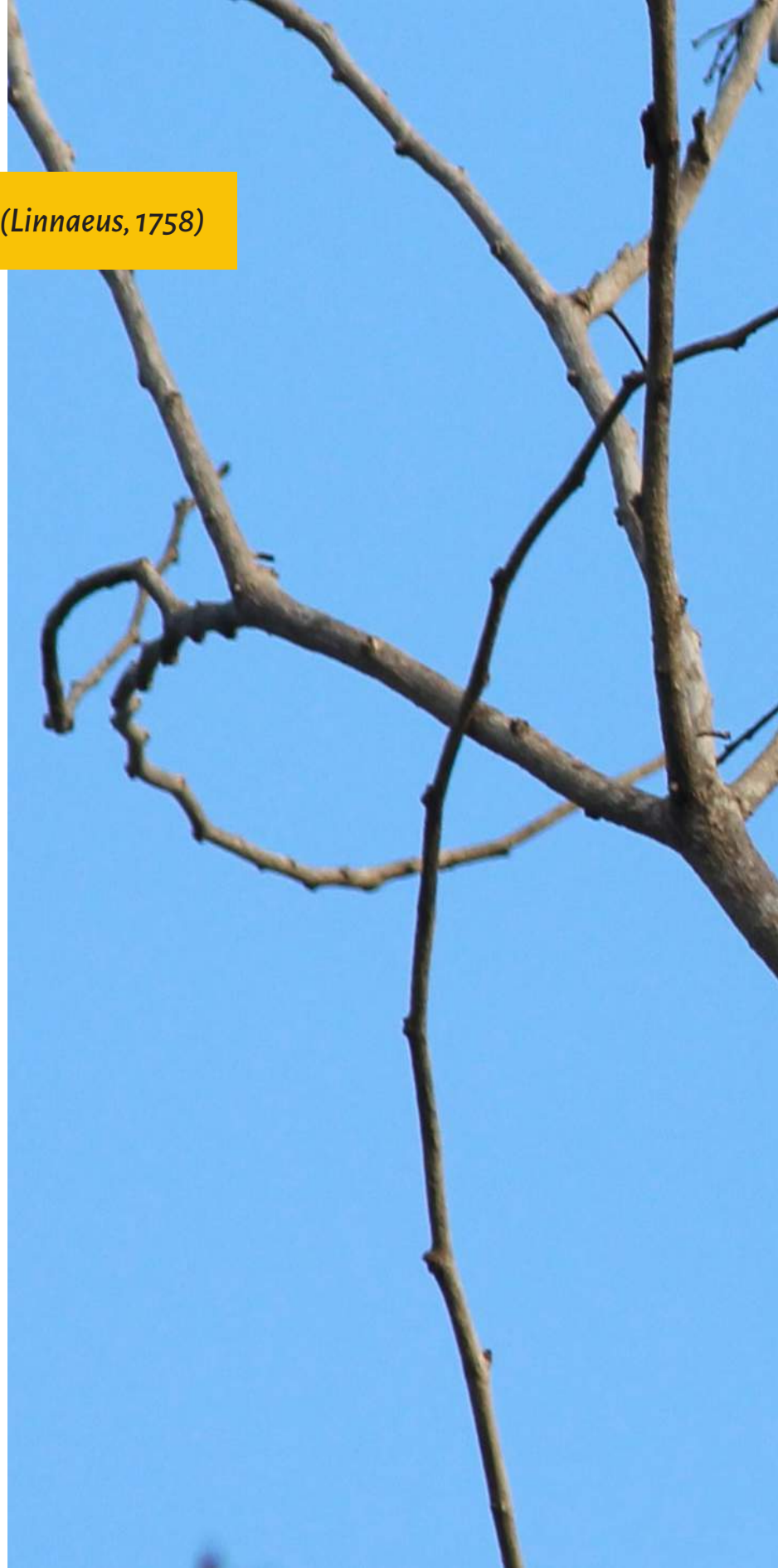
Field characters: Favors deciduous and mixed woodland and parks, especially with tall leafy trees. Shy and difficult to see well, despite bright colors. Tends to remain well hidden in foliage, and flies quickly and easily over long distances. Male unmistakable: golden-yellow with black wings and tail; female and immature greenish yellow overall with variable, fine dark streaking below; note rather stout, reddish-pink bill. Found as singles or pairs.

Distribution: Practically all the Indian Union except NE. states.

Food: Insects, banyan and peepal fruit and berries and nectar.

Call: A harsh cheah and clear fluty whistles something like peelolo.

Nesting: Season- April to July. Eggs: 2 or 3, white spotted with black or reddish brown.



Dicrurus macrocercus (Vieillot, 1817)

Black Drongo

Local names: Rettaivaal kuruvi (Tamil), Anaraanchi (Malayalam), Pasala poli gadu (Telugu), Kotwal (Hindi).

Size: 31cm.

Field characters: An all-black, medium-sized drongo with a long forked tail and a strong bill. Juveniles usually have gray-white mottling on the belly. All ages show a small white spot at the base of the bill. It is common in open countryside habitats such as farms, fields, and wetlands where it perches on a vantage point and pounces on or chases unsuspecting insects, small birds, and animals. It is aggressive towards larger birds or those competing for resources. Sexes alike.

Distribution: Throughout the Indian Union. Food: Insects, flower nectar also occasionally small birds.

Call: A variety of harsh scolding or challenging calls are uttered.

Nesting: Season- principally April to August. Eggs: 3 or 5, mostly whitish with brownish red spots. ■

Lanius cristatus (Linnaeus, 1758)

Brown Shrike

Local names: Keechaan (Tamil), Batte kiritti gadu (Telugu), kerkheta (Hindi).

Size: 19cm.

Field characters: Reddish brown above except for white forehead and supercilium. A black line through eye to ear-coverts. Tail rufous-brown. Wings brownish black, chin, cheek and throat white rest pale fulvous. Some adults with crescentic bars on breast and belly. Easily confused with the Redbacked and pale brown shrikes in the western limits of the distribution.

Distribution: Winter visitor throughout the Indian subcontinent.

Food: Large insects, small birds, mammals, lizards.

Call: A harsh chr-r-r.

Nesting: Extralimital.

Dendrocitta vagabunda (Latham, 1790)

Rufous Treepie

Local names: Vaalkaakkai (Tamil), Olangaali (Malayalam), Kanda kati gadu (Telugu), Mahalat (Hindi).

Size: 50cm.

Field characters: A long and stiff-tailed bird with primarily rusty-brown upperparts and dull orangish underparts. The head, mantle, and neck region are a dull, sooty black. The long graduated tail is pale gray with a wide black terminal band. Note the conspicuous silvery-gray, white, and black patterns on the wings. The blackish-gray bill is stout with a hooked tip. Found in a wide range of habitats from woodlands to scrubby patches, singly or in pairs feeding in the treetops. Sexes alike.

Distribution: Entire Indian Union.

Food: Fruits, insects, lizards, frogs, centipedes, and even carrion, in addition to the eggs and helpless young of birds and rodents.

Call: metallic krowwiiii kroo.

Nesting: season- February to July, chiefly March to May. Eggs: 4 to 5, most commonly pale salmon-white splashed and streaked with bright reddish brown.

Leptocoma zeylonica (Linnaeus, 1766)

Purple-rumped Sunbird

Local names: Oodha pitta thaensittu (Tamil), Manjathaenkili (Malayalam), Shakkarkhora (Hindi).

Size: 10cm.

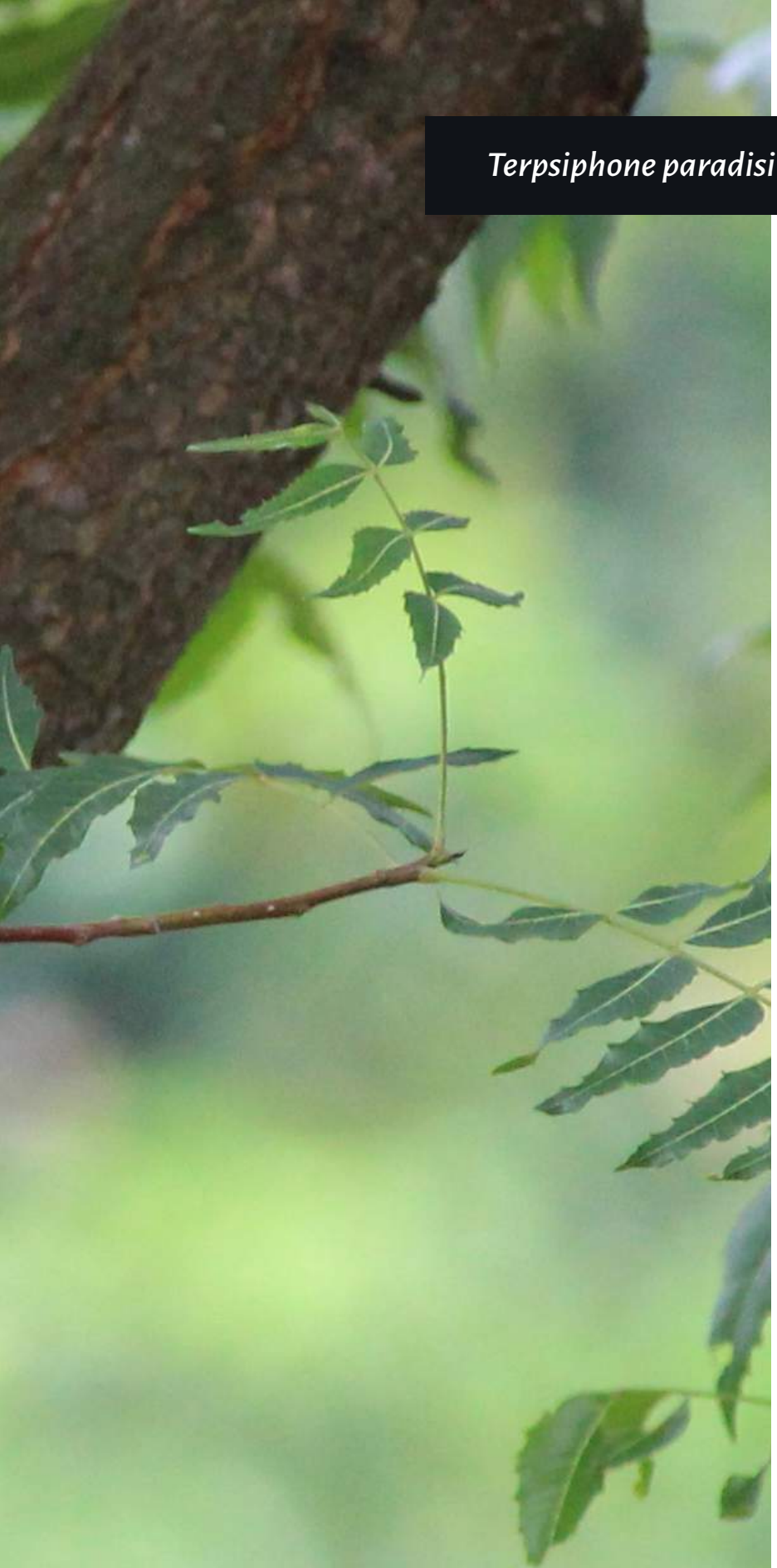
Field characters: A colorful sunbird; the male has a green metallic crown and shoulder patch, a dark brown body with purple a rump, a purple throat, lemon-yellow underparts, and whitish flanks. The female is light grayish-brown above and pale yellow below. The female can be separated from female Purple Sunbirds by their grayish-white (not yellow) throat. Often seen hopping and hovering around flowers, picking up insects, and probing flowers for nectar.

Distribution: Peninsular India north to Mumbai, east to Kolkata.

Food: Nectar, some insects.

Call: a twittering tityou, tityou, trritt, tityou.

Nesting: Season- not well defined. Eggs: 2, greyish or greenish white marked with various shades of brown and grey. ■



Terpsiphone paradisi (Linnaeus,1758)

Indian Paradise Flycatcher

Local names: Arasavaal eepidippaan (Tamil), Vaalkuruvi (Malayalam), Toka pigili-pitta (Telugu), Sultan bulbul (Hindi).

Size: 20cm.

Field characters: A graceful looking flycatcher, the adult male sport a long ribbon-like tail. The males occur in two color morphs cinnamon and white. Both color morphs sport a glossy black head with blue ring around the eye, but white morph is entirely white below while the cinnamon morph has cinnamon upperparts and tail, and dirty white underparts. The females are cinnamon above with a grayish throat, a shorter tail, and they lack the male's blue eye-ring. They make short aerial sallies after insects, usually returning to the same perch. Occasionally descends to ground to pull apart insects. Chiefly found in wooded habitats.

Distribution: Practically throughout the Indian Union. Resident in some localities and migratory in others.

Food: Flies, gnats and other dipterous insects.

Call: Normally a harsh grating che or che-chew.

Nesting: Season- February to July, varying locally. Eggs: 3 to 5, pale creamy pink, speckled and blotched with reddish brown. ■

Cinnyris lotenius (Linnaeus, 1766)

Loten's Sunbird

Local names: Oodha thaensittu (Tamil), Thaenkili (Malayalam).

Size: 13cm.

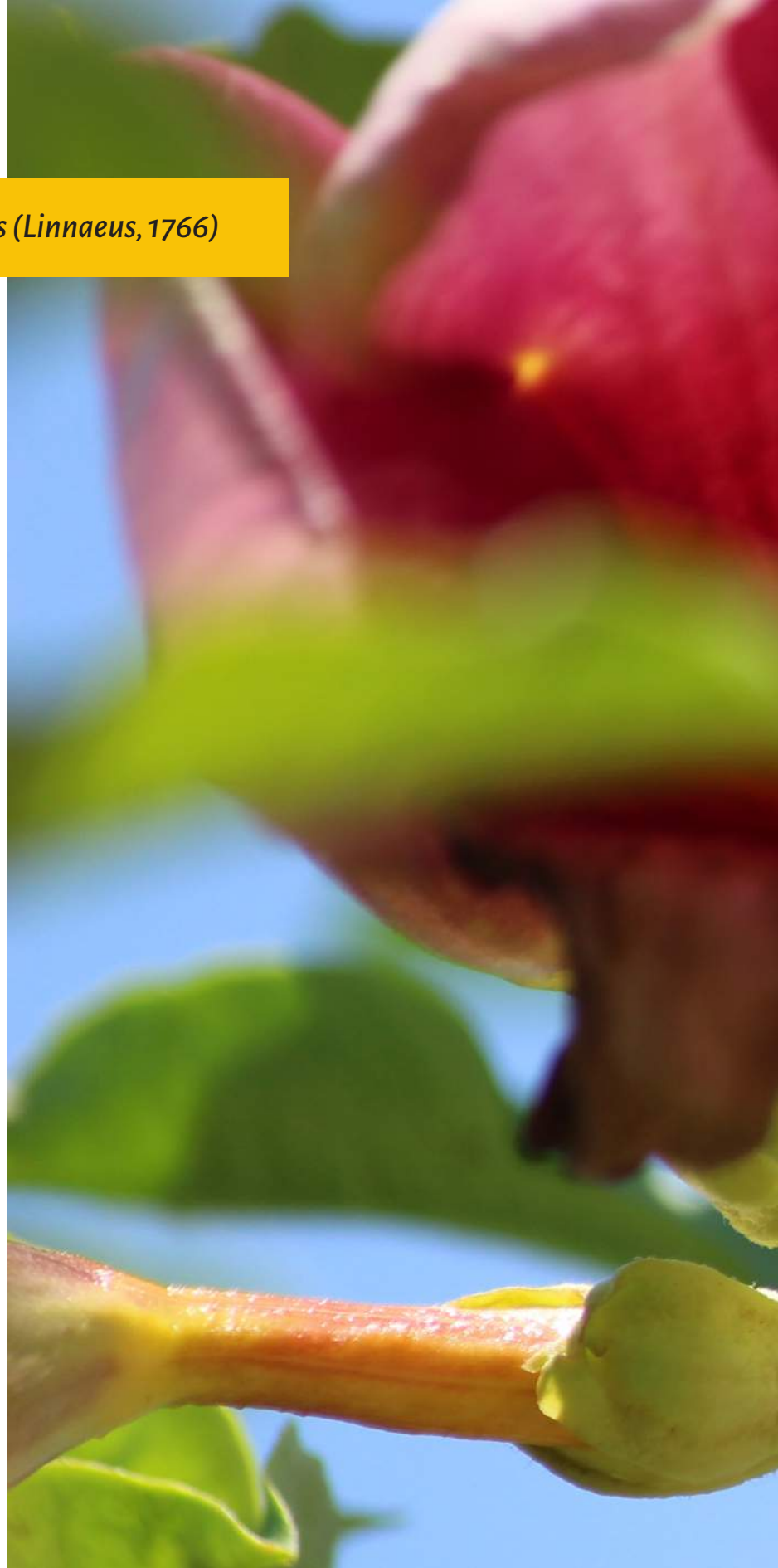
Field characters: Male: Black above with metallic green and purple sheen. Below throat metallic green, metallic purple on breast with a dark crimson or maroon band across breast and bright yellow tufts on sides of breast with are conspicuous even from the rear when erected while displaying. The long, slender, deeply arched bill distinctive. Female: Dull olive. Tail is blue-black with white tips, dully yellow below.

Distribution: Fairly common resident in the Peninsula south of a line from Nasik in Maharashtra to W. Bengal .

Food: Nectar, also spiders and insects.

Call: A sharp metallic chit or cheewit cheewit.

Nesting: Season- March to May. Eggs: 2, brownish white with dull brown spots. ■



Ploceus philippinus (Linnaeus, 1766)

Baya Weaver

Local names: Thookananguruvi (Tamil), Aatrakuruvi (Malayalam), Parsupu pita (Telugu), Baya (Hindi).

Size: 15cm.

Field characters: A widespread weaver that is known for its nest—a long hanging nest with a bulbous chamber and a narrow tubular entrance. Breeding males have yellow forehead and crown, a dark throat that contrasts with yellow underparts. Nonbreeding males and females are similar except they have buffy colors where breeding males are yellow; also note the dark streaks on the back and the broad buffy eyebrow on females. Juvenile resembles female, but lack the female's obvious eyebrow. Baya Weavers lack the strongly streaked appearance of Streaked Weavers. Regional variation in plumage exist mainly in the amount of yellow and black in breeding plumage. Occur as flocks, particularly in breeding season. Advertising calls of males are an easy way to detect the species as several males in the flock call together creating a cacophony of a series of rasping chatters followed by a buzzing whistle interspersed with long chatters.

Distribution: Throughout the Indian Union.

Food: Paddy and grain, also insects.

Call: A long joyous chee-ee.

Nesting: Season- May to September, coincident with paddy cultivation. Eggs: 2 or 4, pure white. ■

Lonchura malacca (Linnaeus, 1766)

Black-headed Munia

Local names: Karunthalai sillai, Thinai kuruvi (Tamil), Aattachemban (Malayalam), Nalla jinuwayi (Telugu), Telia munia (Hindi).

Size: 10cm.

Field characters: Small, finchlike bird of weedy and grassy areas in tropical lowlands. Often in small flocks, which associate readily with seedeaters. Adult is handsome and striking with rusty upperparts. Black head and underparts are cut by a broad white swath from flanks across the lower breast, Pointed tail, Stout gray bill. Juvenile notably plain, buffy brown overall with stout bluish-gray bill. Sexes alike. Found in flocks.

Distribution: Peninsular India to the South of Madhya Pradesh.

Food: Grass seeds, grains.

Call: A low pitched wee-wi-wi.

Nesting: Season- principally the monsoon, June to October, varying with local conditions. Eggs: 5 to 7, pure white. ■

Anthus rufulus (Vieillot, 1818)

Paddyfield Pipit

Local names: Nettai kaali (Tamil), Vayal varamban (Malayalam), Gurapa-modi-pitta (Telugu), Charchari (Hindi).

Size: 15cm.

Field characters: A sparrow-sized, resident pipit with brown plumage that varies in tones in different parts of its range. All birds have a bi-colored bill with a curve to the tip of the upper bill. The breast is streaked and the upperparts have variable amounts of streaking. Juveniles show distinct and dark mottling on the upperparts. It is common in open habitats such as wetlands, farms, fields, and even large parks. Distinct eyebrow, fainter or no streaking on the back of the neck. Sexes alike. Found in pairs or loose parties.

Distribution: Throughout the Indian Union.

Food: Weevils and other small insects.

Call: short tsip and tissip notes.

Nesting: Season- February to October, principally March to June. Eggs: 3 or 4, yellowish or greyish white, blotched and spotted with brown, more densely at the broad end. ■

Motacilla maderaspatensis (J. F. Gmelin, 1789)

White-browed Wagtail

Local names: Venpuruva vaalaatti (Tamil), Valiya vaalukuruvi (Malayalam), Sakala sarela gadu (Telugu), khanjan (Hindi),

Size: 21cm.

Field characters: A rather largish wagtail and the only resident amongst this group. It has black head, back, and upper tail, and white underparts. The broad white eyebrow that extends from the base of the bill to the back of its head is a characteristic. A broad white bar on the wing is visible when sitting and in flight. Female is usually duller black than the male, while immatures have a shorter eyebrow with black areas replaced by grayish-brown and have dirty white underparts. Mostly seen in pairs or family parties, near wet areas of any kind including small pools in lawns and buildings, running around wagging its tail and flying with a characteristic undulating flight.

Distribution: Resident throughout the Indian Union, excepting the NE. states.

Food: Insects, spiders, other invertebrates.

Call: Very vocal; gives a loud 3–4 noted whistle and a psi-sit flight call.

Nesting: Season- elastic, chiefly March to September. Eggs: 3 or 4, greyish-, brownish-, or greenish white, blotched and streaked with various shades of brown. ■

Prinia inornata (Sykes, 1832)

Plain Prinia

Local names: Kathirkuruvi (Tamil), Vayal kuruvi (Malayalam), Lota-kun-jitta (Telugu), Phutki (Hindi).

Size: 13cm.

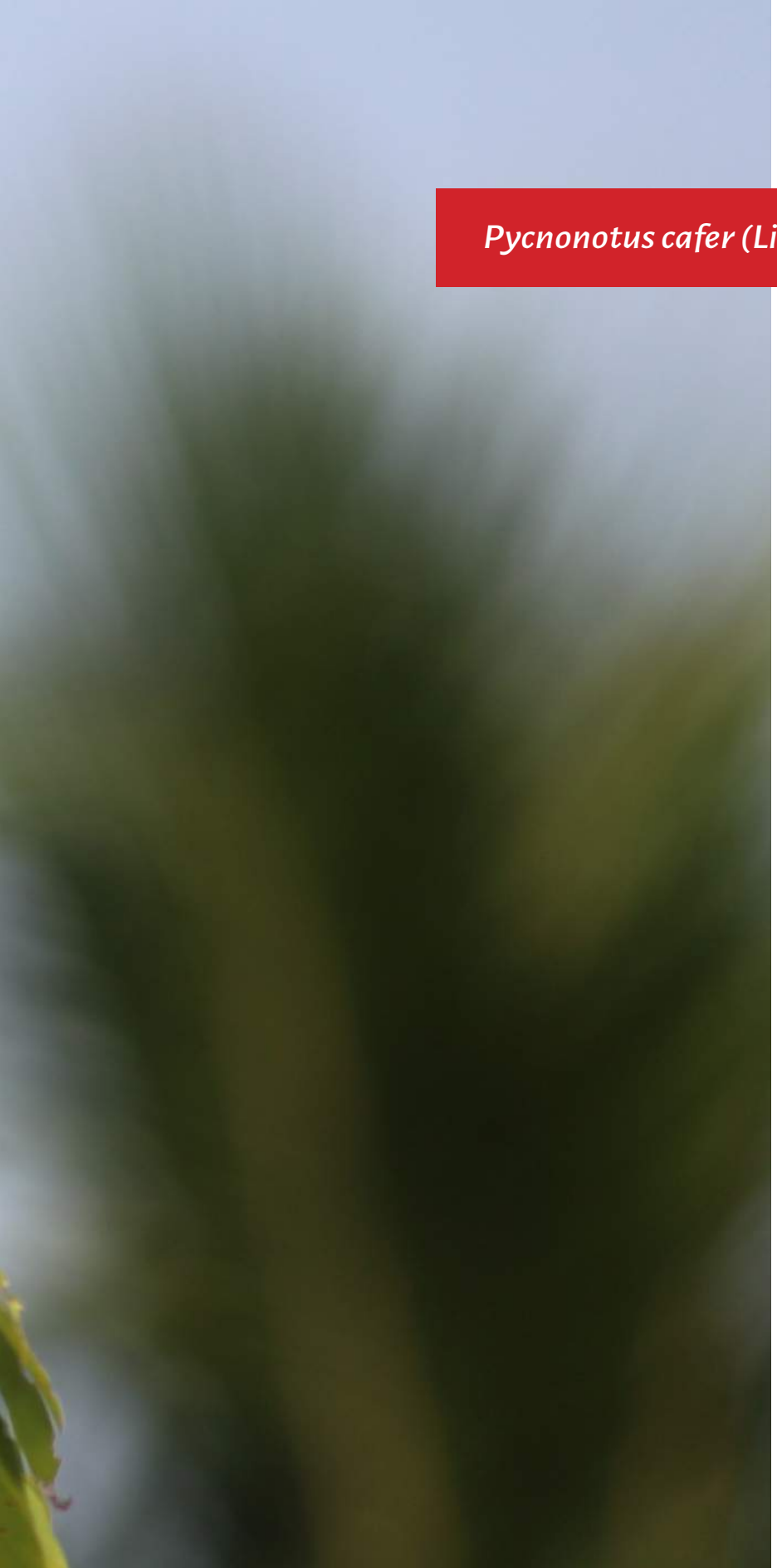
Field characters: A common prinia with drab gray-brown plumage that varies in tone across its range. Note the pale, wide eyebrow and the long tail that appears as if it is loosely attached to the body. Breeding birds have a black bill and a shorter tail. Common in various habitats, especially farms and wetlands, but avoids woodlands with a canopy. A somewhat bold species, it often skulks in the undergrowth but sings from exposed perches. Sexes alike.

Distribution: Entire Indian Union, south of the Himalayas.

Food: Insects, caterpillars, ants, small beetles.

Call: The song is a repeated series of insect-like trills. Calls include various buzzing and clinking notes. A plaintive tee-tee-tee, kink-kink or chi-up.

Nesting: Season- March to September, chiefly SW monsoon. Eggs: 3 to 5, glossy greenish blue, speckled, blotched and penciled with reddish brown. ■



Pycnonotus cafer (Linnaeus, 1766)

Red-vented Bulbul

Local names: Chinnaan (Tamil), Naatu bulbul (Malayalam), Pigli-pitta (Telugu), Bulbul (Hindi).

Size: 20cm.

Field characters: A dark, sleek, medium-sized bird with a black crest and a white rump. The red color under the tail is often difficult to see. Eats fruit, flower buds, and insects. Conspicuous and sometimes gregarious, often seen high in trees or perched on wires. Sexes alike. Found as pairs or small gatherings, in gardens and lightly wooded country.

Distribution: Throughout the Indian Union.

Food: Insects, fruits, berries, peas and vegetables, flower nectar.

Call: A sharp ki-kyu-kyu.

Nesting: Season- chiefly between February and May, varying with local conditions. Eggs: 2 or 3, pinkish white, profusely blotched with purplish brown. ■

Orthotomus sutorius (Pennant,1769)

Common Tailorbird

Local names: Thaiyal kuruvi (Tamil), Adaikkaapakshi (Malayalam), Likka jitta (Telugu), Piddi (Hindi)

Size: 13cm.

Field characters: A common warbler-like olive green colored bird with whitish underparts. It has a long bill, rust colored crown and two elongated pinpointed feathers in tail. It gets its name from the way in which it builds its nest by stitching leaves together. A ubiquitous inhabitant of parks, gardens, and wooded areas. Sexes alike. Found in pairs or singles.

Distribution: The entire Indian Union.

Food: Tiny insects, their eggs and grubs; flower nectar of salmania, Erythrina and other trees.

Call: A loud cheerful towit-towit-towit or Ptti-ptti.

Nesting: Season- April to September, varying locally. Eggs: 3 or 4, reddish or bluish white, spotted with brownish red. ■

Hirundo smithii (Leach, 1818)

Wire-tailed Swallow

Local names: Kambivaal thagaivilaan (Tamil), Kambivaalan (Malayalam), Wana kovela (Telugu), Ababil (Hindi).

Size: 14cm.

Field characters: A very distinctive swallow with two long, thin feathers on its outer tail from which it gets its name. It has brilliant glossy blue upperparts and a chestnut forehead and crown that contrasts with clean white underparts. Females and juveniles have shorter tails. Found in grasslands, wetlands, open scrublands, cultivated areas. Typically seen in singles, pairs, or sometimes small flocks. Sexes alike, but tail wires of female shorter.

Distribution: All over India, Mainly resident but also locally migratory.

Food: Insects.

Call: A lively chit-chit.

Nesting: Season- practically all year; principally March to September. Eggs: 3 to 5, white, minutely speckled and spotted with reddish brown. ■

Hirundo rustica (Linnaeus, 1758)

Barn Swallow

Local names: Thagaivilaan (Tamil), Vayalkothi (Malayalam), Wana kovela (Telugu), Ababil (Hindi).

Size: 13cm.

Field characters: Recognizable even at a distance by its extremely long forked tail and dark rump. Spends a lot of time in flight, zipping over fields and ponds in search of insects. Appears dark above (navy blue in good light) and buffy to white below. Typically nests near people, in barns, under docks and other structures. Sexes alike.

Distribution: Throughout India (in winter)

Food: Flies and midges.

Call: A pleasant kwi-kwi-krrr

Nesting: season- April to July. Eggs: 4 to 5, white speckled with reddish brown. ■

Sturnia pagodarum (J. F. Gmelin, 1789)

Brahminy Starling

Local names: Karungondai naaganavaai (Tamil), Karindhalachikkali (Malayalam), Papata gorinki (Telugu), Puhaia (Hindi).

Size: 22cm.

Field characters: A small fawn-colored starling with a long wispy crest that usually lies limp over the back of its head, but the feathers on its cheek and upper breast stand up and away from its cheek. Its upperparts are gray and the dark tail is tipped in white. Notable yellow bill with a blue base. Often seen in small family groups. Sexes alike.

Distribution: Practically all over India except most arid and humid evergreen parts. Mainly resident but also partial migrant.

Food: Berries, wild figs and insects.

Call: They have a wide repertoire of calls and are also given to mimicking other species.

Nesting: Season- May to July. Eggs: 3 or 4, pale blue, unmarked. ■

Acridotheres tristis (Linnaeus,1766)

Common Myna

Local names: Naaganavaai, Naakathaan kuruvi (Tamil), Myna (Malayalam), Goranka (Telugu), Gorwantera (Kannada), Desi myna (Hindi).

Size: 23cm.

Field characters: A large, black myna with white wing patches, a yellow bill, and yellow legs. Gregarious and often found in querulous flocks. Can be found just about anywhere but the densest forests. Sexes alike.

Distribution: Throughout the Indian Union.

Food: Omnivorous. eats fruits, insects, kitchen scraps.

Call: Has variety of sharp calls and chatter. radio-radio-radio, keek-keek-keek, chur-chur.

Nesting: Season- April to August. Eggs: 4 or 5, glossy blue.

Saxicoloides fulicatus (Linnaeus, 1766)

Indian Robin

Local names: Karunjittu (Tamil), kalmannathi (Malayalam), Kalchuri (Hindi).

Size: 16cm.

Field characters: A sprightly black bird with a white patch on wing and rusty red under root of cocked tail. Female is ashy brown without the wing patch. Found in pairs, in dry open lightly wooded places.

Distribution: Throughout Indian Union.

Food: Insects and their eggs, spiders.

Call: A sharp kee-ki-ki-ki.

Nesting: Season- April to June. Eggs: 2 or 3, creamy white. ■

Copsychus saularis (Linnaeus, 1758)

Oriental Megpie Robin

Local names: Vannaathi kuruvi (Tamil), Mannathipullu (Malayalam), Pedda nalanchi (Telugu), Dhaiyar (Hindi).

Size: 20cm.

Field characters: A medium-sized robin with a broad white wingbar running from the shoulder to the tip of the wing and white outertail feathers. Males sport black-and-white plumage while the females are grayish brown and white. Juveniles resembles females, but have a scaly head and upperparts. These birds are often seen in cultivated areas, woodlands, and gardens. Distribution: Throughout Indian Union except arid areas.

Food: Insects and flower nectar.

Call: They have a good repertoire of melodious calls and are known to imitate other bird calls. The most commonly heard call is a whistle given at dawn. Most often seen singing from a high exposed perch. A plaintive swee-ee.

Nesting: Season- April to July. Eggs: 3 to 5, pale blue-green, blotched and mottled with reddish brown. ■

Euodice malabarica (Linnaeus,1758)

Indian Silverbill

Local names: Venthondai sillai (Tamil), Vayalaarru (Malayalam)

Size: 10cm.

Field characters: Small, long-tailed finch with a chunky body and short, stout bill. Gray-brown above and pale below with a whitish rump and black-pointed tail. Highly sociable throughout the year. Found in semidesert, scrub, and dry woodland but also proliferates in urban areas. Distribution is centered on the Indian subcontinent, but it is a popular cage bird and feral populations are widespread.

Distribution: Throughout Indian subcontinent.

Food: Grains

Call: Sharp kli-kli-kli-kli

Nesting: Principally during monsoon.

Prinia socialis (Sykes, 1832)

Ashy Prinia

Local names: Sambal kathirkuruvi (Tamil), Kathirvaalan kuruvi (Malayalam), Phutki (Hindi)

Size: 13cm.

Field characters: A common prinia that is likely to occur in all habitats except for woodlands with a thick canopy. All birds have a black bill, pale cinnamon underparts, a gray head, and a grayish-brown back. Nonbreeding birds acquire a short eyebrow and a longer tail. There is a marked variation in plumage tones in various parts of its range. It usually sticks to the undergrowth and shrubbery, though individuals often sing from a higher perch such as wires. Usually occurring in ones and twos, and it can be quite bold and fearless. Sexes alike.

Distribution: Entire Indian Union.

Food: Insects.

Call: A plaintive tee-tee-tee.

Nesting: Season- March to September, mainly after onset of monsoon. Eggs: 3 or 4, glossy brick-red with a dark ring around broad end. ■

Athene brama (Temminck, 1821)

Spotted Owlet

Local names: Pulli chiru aandhai (Tamil), Pulli nathu (Malayalam), Halakki, Goobe (Kannada), Chughad (Hindi).

Size: 21cm.

Field characters: A small uncrested owl with a round head and a short tail. It is grayish-brown overall with white spots above while its underparts are white with brown bars. Distinctive white eyebrows and neck-band. Often active at dawn and dusk. Inhabits all kinds of open habitats but avoids dense forest and wetter regions. Sexes alike. Found in pairs or family parties.

Distribution: Throughout the Indian Union.

Food: Chiefly beetles and other insects; also young birds and mice and lizards, etc.

Call: Utters a loud “chirurr-chirurr-chirurr” laugh in addition to a variety of high-pitched squeals and whistles.

Nesting: Season- principally November to April. Eggs: 3 or 4, white roundish oval. ■

BUTTERFLIES

Butterflies are classified under the Order Lepidoptera, together with the moths (Raju Kasambe, 2016). Butterflies and moths have fascinated people for centuries. They are also important for functioning ecosystems. They provide pollination to specific species of plants; provide food for many animals from song birds to bears; they act as a platform for science education; and they are worth millions of dollars to economies around the world (IUCN SSC Butterfly specialist group, 2017). Butterflies are intrinsically valuable and are worthy of conservation in their own right. Butterflies are good biological indicators of habitat quality as well as general environmental health (Larsen 1988; Kocher and Williams 2000; Sawchik et al. 2005 and Anand Padhye, 2012). Butterflies are a highly diverse group comprising over 250,000 species and make up around one quarter of all named species (Raju Kasambe, 2016).

Ecosystem value of Butterflies are indicators of a healthy environment and healthy ecosystems. They indicate a wide range of other invertebrates, which comprise over two-thirds of all species. Areas rich in butterflies are rich in other invertebrates. These collectively provide a wide range of environmental benefits, including pollination and natural pest control. Butterflies are an important element of the food chain and are prey for birds (like bee-eaters, drongos and flycatchers), bats and other insectivorous animals (like lizards and geckos). Butterflies support a range of other predators and parasites (like the parasitoid wasps), many of which are specific to individual species, or groups of species (Raju Kasambe, 2016).

The world butterfly species around 1, 75,000 and in India the butterfly species recorded are closer to 1225 of which Hesperids 321, Palionids 107, pierids 109, Lycanids 443, Nymphalids 521 (Issack Kehimer BNHS). They are one of the most amazing and magnificent elements of biodiversity, spread through diverse habitats from cooler regions to tropical forests. In the Neo tropical region, 31.4 % of species were described, representing the highest diversity in global biomes (Heppner1991). It is estimated that the richness of this order could reach 500.000 species, and just 7.784 species of butterflies are known. Butterflies face a wide range of threats including habitat loss, climate change, disease, pesticides, and invasive plants all of which are leading to declines in many species worldwide. Monitoring and the assessment of butterfly diversity is an important for conservation and management of biodiversity (Naik, D. & M.S. Mustak, 2016). The present study is a first attempt was made to study and document the butterfly species diversity in CUTN campus, Thiruvarur. The present study was carried on the CUTN main university campus as well as residential campus.

Chapter-2

Pachliopta hector (Linnaeus, 1758)

Crimson Rose

Expanse: 90-110mm.

Genitalia: Valve much aborted, a slender straight rod with the point bent dorsal nearly at a right angle, and bearing a short spine; dorsal margin beset with short straight bristles, giving the whole organ the appearance of a comb; base broadly dilated, and both valves incline towards each other so that the summits are almost in contact. Scaphium represented apparently by the scaphial teeth. These are two pear-shaped organs each of which sends off a broad process of subtrigonal outline, horizontally, towards the middle of the cavity; the process is a sort of flat cushion, apparently of short close pile, throughout which are set minute slender needle-like spines vertically; the end is a thickened knob, whence descends obliquely a group of very long straight bristles. Gosse (1883, p. 332) remarks that there is a, very close resemblance between all the organs (except the uncus) in P. hector and the, corresponding organs in, the Saturniid moth Antheraea roylei (Gosse, 1883).

Larva: Head round, black and shiny, somewhat hidden under segment 2. Segment 2 with four bright red, short, fleshy tubercles on front margin of dorsum, and two, similar ones on the back margin. Segments 3 to 13 each with a subdorsal, longish, conical, fleshy tubercle, and a marginal row of similar tubercles. In addition segments 2 to 5 'with a, lateral row of similar tubercles, the one on segment 5 reduced to a, spot. On the front margin of segments 8 to 12 are two subdorsal, flesh-coloured spots, and on the 7th segment are two larger similar spots on the posterior margin. Lateral flesh-coloured spots on segments 6 to 14. All the tubercles bright red. Spiracles oval, shiny black. The two long tubercles on segment 2 are black-tipped. Colour of body rich black-brown. Osmeterium orange. Length 45 mm; breadth 10 mm. On Aristochia indica Linnaeus. (From Bell, 1911).

Pupa: Head flat in front, produced in two sharp-edged, semi-circular, rounded, ear-like, lateral projections connected by a ridge. Thorax carinate on dorsal line. Segments 8 and 11 each have two large ear-like projections. Cremaster short, strong, square at the end. Colour light brown, marked on the dorsum with white, looking like brown alabaster; a whitened dorsal line on segment 2, another raised line on each side of this, and another round the spiracle of the same segment. Length 30 mm; breadth 10 mm. (from Bell. 1911).

Habits: One of the commonest butterflies of the plains, but is found singly even at elevations of over 5,000 feet. It is often found on low flowering bushes and plants. In the 'Entomologist's Monthly Magazine,' 1880, p. 276. Mr. R. S. Eaton notes that in Bombay this butterfly roosted in great numbers together.

Habitat: Ceylon, peninsular India, and the Andaman Islands. Occurs in the nilgiris from 1,000 to 7,000 feet. Very rare in the Andaman's.

Wing span: 90–110mm. Larval Host Plants: Aristolochia spp., A. bracteolata, A. griffithii, A. indica, A. tagala (Aristolochiaceae).

Distribution: Entire Western Ghats. Peninsular India upto West Bengal. Straggler to the Andamans and Uttarakhand. ■

Pachliopta aristolochiae (Fabricius, 1775)

Common Rose

Expanse: 80-110 mm.

Genitalia: Harpe takes the place of the claspers, which are much reduced. Shape somewhat like a bell-jar with thickened margins and a bulbous apex which is beset with minute curved spines and is inclined dorsad (Gosse, 1883).

Variation: 1. Discal spots of hind wing proximally reduced and therefore remote from the cell. Form aristolochiae (Fabricius) 2. Discal spots of hind wing placed close to the, cell. Form diphilus. Both forms fly together, but aristolochiae appears to be the commoner one during the hot rainy season.

Larva: Black, with red fleshy tubercles; the tubercles are short, and there are no flesh-coloured spots; no lateral tubercle on segment 5; segment 11 with a white spot at the anterior base of the subdorsal tubercle, and an indication of one in the same position on segment 12; segment 8 with a small white spot at the posterior, and a larger one at the anterior base of subdorsal tubercle; posterior half of segment 7 pure white; osmeterium orange. Length 30 mm; breadth 8mm.

Pupa: Abdomen with four pairs of rounded lobes, and the lateral lobes of the thorax also rounded.

Habits: Visits flowers and is sometimes taken in crowds on flowering trees, especially in the early morning.

Habitat: The whole of India, except.

Wing span: 80–110mm.

Larval Host Plants: Aristolochia spp., A. bracteolata, A. griffithii, A. indica, A. tagala, Thottea siliquosa, Bragantia wallichii (Aristolochiaceae).

Distribution: Throughout India. ■

Papilio polytes (Linnaeus, 1758)

Common Mormon

Genitalia: Harpe resembles that of the Memnon Group; the broad distal end hatchet-shaped, much broader than in helenus, the dorsal edge unevenly serrate (Gosse, 1883, p. 301, pl. xxix, figs. 7-9)

Egg: Spherical, hardly perceptibly rough on the surface. Pale orange, opaque, shiny, smudged with pale brown. Diameter 1·2 mm." (Bell, 1911).

Larva: "Resembles polymnestor. Head yellow; crests on segments 4 and 5 yellow; ocellus back. The usual two tubercles on segments 2 and 13. Dorsally a, rich glaucous green, slightly yellowish on the sides; bands and markings on segments 7 to 10 are white, blotched with red-brown or brown, with venter brownish white suffused with red-brown or brown,. Length 40 mm; breadth 8 mm. at the middle" (Bell, 1911).

Pupa: Olive-brown, with brown, green, and yellow spots and stripes, the underside of the abdomen milk-white, or the whole pupa green; the horns on the head short, obtuse, rather widely separated, the thoracic horn short, the dorsum at the base of abdomen rather strongly incurved, the wing- cases moderately protruding" (Jordan, 1909 a).

Habits: The larva feeds chiefly on species of Citrus, but also on Murraya, Triphasia, and Xanthoxylon; it is not very subject to the attacks of ichneumons. The imago occurs everywhere in open woods and in gardens at low elevations, in the Himalayas up to 6,000 feet. It seldom rises far from the ground, preferring the shelter of bushes, thick places in the jungle, and of hedges. It is fond of visiting flowers, but does not come to wet places on the roads. The flight of the male is very swift, restless, and oscillating. The female in its slow flight resembles its Polydorus models. The different female forms fly at the same time, but are not equally common. They visit flowers, but are best caught when laying their eggs. The species is very easy to breed, but occasionally remains for a long time in the pupal stage.

Bionomics: This species was made the subject of an important series of breeding experiments carried out in Ceylon by J. C. F Fryer. The results were published in the Phil. Trans. Roy. Soc. Lond. B, cciv, 1913, pp. 227-54. It, was shown that the relationship existing between the three forms could be explained on ordinary Mendelian lines. In Ceylon this species has reached a position of Mendelian stability.

Wing span: 90–100mm.

Larval Host Plants: Aegle marmelos, Atalantia racemosa, Citrus spp., C. aurantiifolia, C. maxima, C. limon, C. medica, Clausena anisata, Correa spp., Glycosmis spp., G. pentaphylla, Murraya spp., M. koenigii, M. paniculata, Ravenia spectabilis, Triphasia spp., Zanthoxylum spp., Z. rhetsa (Rutaceae).

Distribution: Subspecies: Throughout India below 2000 m elevation.

Papilio demoleus (Linnaeus, 1758)

Lime Butterfly

Expanse: 80-100 mm. Variation: The red spot of the hind wing is sometimes reduced proximally, and therefore separated from the blue lunule by a black spot. This is f. demoleinus Ob. Many specimens have on the fore wing above a small discal spot before vein 5; sometimes (especially in Ceylon specimens) there are two small spots on the hind wing above, outside the cell, between veins 4 and 6

Egg: Pale, yellow.

Larva: The young larva blackish, a large V-spot in the middle, a latera stripe from the prothorax backwards, and a second stripe running from the anal segment forwards, milky-white; several rows of setiferous process" (Jordan, 1909a).

Full grown larva: Body above yellow-green, with a fairly broad greasy-looking white lateral band from segment 5 to the end. The perpendicular part of the anal segment is whitish. The green dorsal part of segments 2 to 5 is bordered narrowly with a curved black line, and does not reach the base of the legs, the part below, as well as abdomen and legs, being a dirty transparent white. On segments 8, and 9 is a diagonal band reaching from the, centre of 9 near dorsum to the anterior margin of segment 8; this band is irregular in contour and is yellow-brown, spotted with lighter colour. There is a similarly, coloured patch at the posterior lower margin of segment 10. Prolegs large and fleshy. The bands are sometimes obsolescent. Osmeterium flesh-coloured. Length 33 mm; breadth 7 mm. (from Bell, 1911).

Pupa: Head with two short frontal projections which are separated widely and squarely by a sharp ridge forming the front margin of head. Abdomen, dorsally on segments 4 to 8 rather flat, the wing-expansions very slight, so that at segment 7 the pupa is very little broader than at the shoulders. Cremaster square and broad. A pair of very small tubercles at the base of each of the head-projections, and a subdorsal one on each of segments 8 to 11. Colour green, mixed with yellow on dorsum of abdomen. When a pupa is formed in a cage or not among leaves it is generally different shades of browns and greys. Length 30 mm. breadth 10 mm. (from Bell, 1911).

Habits: The larva feeds on plants of the family Rutaceae. It is much subject to attack by parasites. The pupa is formed on the underside of a leaf, against a stalk or twig, and the supporting loop is rather short. The butterfly has a very quick and strong flight. It does not rise much above the ground and is fond of flowers and the sun, visiting by preference the flowers of Citrus trees and Raphanus; it also congregates at puddles, where it drinks with closed wings. It is commoner in the plains than in wooded country and hills, and may be seen on the wing throughout the year. Recorded by Williams (1927, p. 19) as having taken part in a migratory flight in Ceylon.

Habitat: Ceylon, the whole of India to northern Burma. Also extending to Persia and Arabia. Very common.

Wing span: 80–100mm.

Larval Host Plants: Rutaceae, Acronychia pedunculata, Aegle spp., A. marmelos, Citrus spp., C. aurantiifolia, C. maxima, C. sinensis, Glycosmis pentaphylla, Limonia elephantum, Murraya spp., M. koenigii, Ruta angustifolia, R. graveolens, Chloroxylon swietenia, Toddalia trifoliata (Rutaceae); Ziziphus spp., Z. jujuba (Rhamnaceae), Cullen corylifolium (Fabaceae); Tilia spp. (Malvaceae).

Distribution: Throughout India below 2000 m elevation. ■

Catopsilia pomona (Fabricius, 1775)

Common Emigrant

Expanse: 55-80 mm.

Larva: The head is round, green, clypeus edged with brown, covered with small shiny black tubercles which do not hide the colour of the head; the anal flap is rounded, but looks square at the extremity, and is covered with rows of small black tubercles of which only the row along the spiracular line is conspicuous. The spiracles are oval, shiny, and white. The colour is green, with a spiracular white band touched with bright yellow on segments 2 to 5, and these segments, especially 3 and 4, are distinctly flanged on the spiracular line as in the larva of Hebomoia australis Butler, though not to so great an extent. Length, 51 mm."

Pupa: The pupa is the same as that of C. crocale at first sight, but the dorsal line of the thorax is absolutely parallel to the longitudinal axis of the pupa for two-thirds of its length, consequently the hind part just before the margin is perpendicular to this part, i.e., is raised suddenly but very slightly above the front margin of segment 4, and the front end of this parallel dorsal line is at an angle, and a sharpish angle, with the front slope of the thorax the cremaster is distinctly bifid at the extremity, and has some shiny, very stout, black suspensory hooks dorsally as well as at the extremity. There is a dorsal rugose black tip to the snout terminating the head, which snout is cylindrical in its apical half; there is no black line round the eye as in C. crocale, and there is a dark green-blue dorsal line which is yellow on the thorax as well as the supra-spiracular yellow line. Length, 34 mm; length of snout, 3 mm; breadth at segment 7, 9 mm; height at apex of curve of wings (segment 6), 10 mm.; height at the apex of the thorax, 8 mm."

Wing span: 55–80mm.

Larval Host Plants: Bauhinia racemosa, Butea monosperma, Cassia spp., C. fistula, Dalbergia latifolia, Senna tora, S. siamea, Sesbania grandiflora (Fabaceae).

Distribution: Throughout India.
Entire Western Ghats. ■

Common Jezebel

Expanse: 66-83 mm. Scent-scale: Flask-shaped, very broad at the base, with a thick and scarcely tapering neck, which is furnished with fimbriae for half, or nearly half, its length; the disc rather large.

Genitalia: Valve broad, with rounded apical edge, ventral edge slightly rounded, dorsal edge strongly excurved posteriorly. Uncus rather broad, with three small and wells separated lobes; middle lobe triangular, larger than the lateral ones, which are short, narrow, and rounded.

Variation: Much individual variation occurs on the underside (see Manders, 1912). The species has a restricted range, and so has not produced any subspecific form. A rare aberration occurs in which the hind wing spots are yellow instead of red.

Egg: The eggs are deposited usually on the upper surfaces of tender leaves of the mistletoe, one to several eggs being laid on the same leaf. Up to sixty-nine eggs have been found in a, cluster on a single leaf. Even when thus deposited in a cluster, unlike most butterfly eggs, they are scattered irregularly. They stand vertically on the surface on one end, which is broad, or lie on one side. The egg is about 11 mm. high and about 1 mm. in diameter at the base. It is round, flask-shaped, being narrow at the top, which, however, does not end in a point but is concave. There are longitudinal ribs on the surface. The upper ends of the ribs run beyond and project to some extent beyond the rim of the, concavity. The colour is yellow (Ghosh, 1914). The larva and pupa have been fully described by Bell (1912 a), and the following is taken from his descriptions:-

Larva: The larva, on emerging, eats the egg-shell, and then moves off, closely followed by the others, to the margin of the leaf, which is nearly always an old one, and never a very young one. They commence feeding side by side, finishing one leaf after another, until full-fed. They are always badly parasitized, generally by Diptera. They are sluggish in movement, and drop by a silk thread when disturbed, though not very readily. When about to pupate, each larva goes off by itself and attaches itself by the tail-pad and girdle to a horizontal or perpendicular surface. Head round and somewhat flat, black, with a white line at the base of the jaws and mandibles; antennae white, black-tipped. The body is coloured a greasy, greenish-yellow brown; second segment with anterior half white, and behind this a dorsal black patch; a lateral white line on segments 2 and 3; head sparsely covered with white hairs; segment. 2 with six white hairs; a subdorsal row of long, white, erect hairs; a dorso-lateral and supraspiracular row of white hairs; body covered with small white tubercles bearing each a small, erect white hair; venter yellow. Length, 40 mm. breadth, 6mm.

Pupa: Head rounded in front, the vertex bearing two subdorsal, cylindrical, round-topped, short tubercles, one on each side; a single central, short and spherical, very short-pedicelled tubercle, directed forward; segment 2 highly carinate in dorsal line, and slightly convex; thorax carinate in dorsal line, separated from segment 2 by a depression, short, with a broad and convex tubercle on the shoulder; abdomen swollen at segment 7, which is the stoutest part of the body; cremaster stout, triangular and down-curved; a dorsal row of pointed; conical, rather large tubercles on segments 6 to 11; a subdorsal row of much smaller tubercles on segments 2 to 12, and a supraspiracular row on segments 3 to 9. The surface is smooth, shiny, and of a slightly greenish light yellow; front tubercle of head, dorsal tubercles, and lateral tubercles on 6 to 9 shiny black; abdomen patched laterally with black on segments 10 to 12; sides, underside, and base of cremaster are marked more or less with black, and there are black marks on the wing-cases and underside of head. Length, 25 mm; breadth, 7 mm.

Habits.-The larvae feed on Loranthus growing on various trees, such as mango, sissoo (Dalbergia sissoo Roxb, Leguminosae), gula (Ficus glomerata Roxb, Moraceae), etc., and are very largely found about March. The butterfly has been bred upon Loranthus longiflorus Descr, elasticus Descr, and scurrula Linn. The butterflies have been observed at Pusa and at Rangpur to visit mustard flowers in large numbers in November and December. They are weak fliers and flutter about, hardly ever flying straight. They rest with the wings closed over the back, are found on the wing in all weathers, and occasionally may be seen drinking at moist patches on roads and in river beds in the hot weather. The is said to have a, strong scent, sometimes very strong, something like that of sweet briar.

Mimicry: D. eucharis (Drury) is very closely resembled by Prioneris sita Feld. On both surfaces and in both sexes. The resemblance on the underside of the hind wing is very starting, and represents one of the best known examples. Both species were observed by Fraser (1931) at Lakati, flying together, the Prioneris in overwhelming superiority. **Habitat:** Ceylon and peninsular India as far as the lower slopes of the Himalayas. Abundant in Ceylon up to 4,000 feet, and elsewhere up to 7,000 feet.

Wing span: 66–83mm.

Larval Host Plants: Butea monosperma (Fabaceae), Dendrophthoe falcata, D. glabrescens, Loranthus spp., L. cordifolius, L. longiflorus, Helicanthes elasticus, Scurrula parasitica, Taxillus vestitus (Loranthaceae); Abelmoschus moschatus, Pterospermum acerifolium (Malvaceae); Viscum album (Santalaceae).

Distribution: Throughout India except Andaman & Nicobar Islands, Lakshadweep. ■


Delias eucharis (Drury, 1773)

Eurema hecabe (Linnaeus, 1758)

Common Grass Yellow

Early stages and habits: (as observed in simulata (Moore), from Bell, 1913).

Egg: Spindle-shape, the top bluntly pointed; many very fine longitudinal ribs, and many fine transverse striae. White when laid, quickly becoming yellow.

Larva: Dark green, mostly glaucous on the sides, with a spiracular narrow white band from head to end of anal flap. Length, 22 mm; breadth, 3 mm.

Pupa: Like that of E. libythea rubella (Wall.). Snout conical, not long, rather sharply pointed. Cremaster rather longer than broad, strong, trapeze-shaped, the nearly square extremity, as well as the adjacent ventral surface, set with short suspensory hooklets. Usually green, with a rather dark violet-grey dorsal line; dorsal margin of wing also violet-grey, this colour continued along abdomen above spiracles; a faint white spiracular line; the line of suture of wings near abdominal end dark. Some pupae are much marked with smoky grey, especially on the wings. Length, 17 mm; breadth, 3·5 mm.

Habits: The eggs are laid singly on young shoots and leaves. Larva feeds upon Leguminosae: Cassia, Wagatea, Acacia, Serbania, Cmsalpinia, Albizzia, etc. The butterfly is a stronger flier than the others and keeps on the wing for some time, often ascending high in the air. It comes freely to flowers, and frequents damp places in the hot months, being equally abundant in the shady extensive forests of the hills and in the open hot plains. According to Manders (1910) the food-plant in Ceylon is usually the" Madras Thorn," Pithecelobium dulce Benth.

Wing span: 40–50mm.

Larval Host Plants: Fabaceae, Acacia spp., Aeschynomene americana, Senna alata, S. tora, S. obtusifolia, Albizia spp., A. procera, A. saman, Caesalpinia spp., C. mimosoides, C. pulcherrima, C. sappan, Cassia spp., C. fistula, S. sesban, Smithia conferta, S. sensitive, Mimosa pudica, Moullava spp., Moullava spicata, Peltophorum pterocarpum, Pithecellobium dulce, Sesbania spp., S. bispinosa, S. grandiflora (Fabaceae).

Distribution: Throughout India, including the Andaman and Nicobar Islands.

Family: Lycaenidae. ■

Euchrysops cnejus (Fabricius, 1798)

Gram Blue

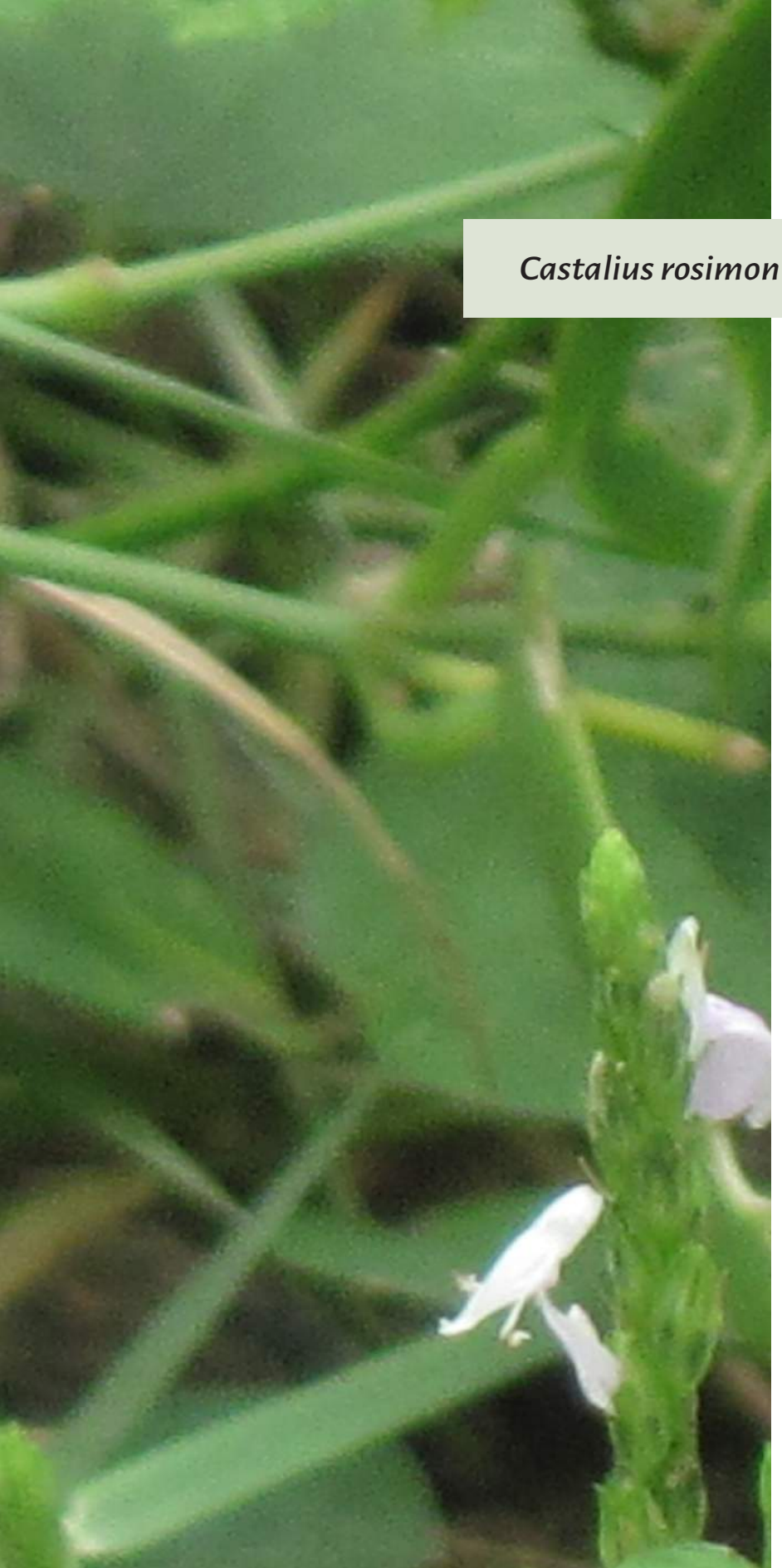
Habitats: "Of the usual Lycaenid shape. The head small, black, shining, retractile. Colour of body pale green with darker green or reddish dorsal and subdorsal lines, the latter coalesced into a broad band between the eleventh and last segments. The entire surface of the body covered with minute white tubercles, there are also a few scattered white hairs. The segmental constrictions shallow. Spiracles black. Extensile organs on the twelfth segment small. The larva is broader than high in its higher part, increasing in width to fourth segment, from thence to the flattened anal segment of about uniform width. Bred by me in Calcutta on Phaseolus trilobus. Mr. W. O. Taylor reports that the larva feeds in Orissa on Dolichos catjang, Roxb. Dr. A. Forel identifies the ant in Calcutta as Camponotus rubripes subspecies compressus" (de Niceville.)

Pupa: "Very pale green, the abdominal segments somewhat opaque; of the usual Lycaenid shape, no distinctive structure or markings. Head-case square, thorax slightly humped, slightly constricted before the first abdominal segment, a dark dorsal line extending the whole length; spiracles black; entire surface smooth not hairy." (de Niceville.)

Wing span: 25–33 mm.

Larval Host Plants: Fabaceae, Acacia spp., A. caesia, Vigna cylindrica, V. radiata, V. trilobata, V. unguiculata, Butea monosperma, Cajanus cajan, Canavalia ensiformis, Lablab purpureus, Desmodium oojeinense, Paracalyx scariosus, Phaseolus spp., Pisum sativum, Pueraria phaseoloides, (Fabaceae).

Distribution: Throughout India. ■



Castalius rosimon (Fabricius, 1775)

Common Pierrot

Larva: "Feeds on Zizyphus jujuba and is of a rough texture as if shagreened all over. It is of the usual woodlouse form, much flattened towards the anal segment which is very broad; head concealed; colour bright green with a double, dorsal, yellow line and the sides powdered with small yellow spots." (Davidson, Bell and Aitken)

Pupa: "Of the usual Castalius form but narrow and slightly flattened. It is intensely glossy as if covered with gum. It varies in colour, being sometimes black, at others green with inconstant black markings." (Davidson, Bell & Aitken)

Wing span: 24–34 mm.

Larval Host Plants: Ziziphus jujuba, Ziziphus oenopolia, Ziziphus rugosa, Ziziphus xylopyrus (Rhamnaceae).

Distribution: Throughout India including Andaman & Nicobar Islands. ■

Ariadne merione (Cramer, 1779)

Common Castor

Expanse: 52-62 mm. (2.05-2.43").

Larva: "Cylindrical, slender; segments armed, with two dorsal and two lateral rows of short branched-spines; head with a pair of long, straight, branched-spines. Colour green with dorsal longitudinal dark brown lines." (Moore.)

Pupa: "Slender, wing-eases somewhat dilated, a dorsal protuberance and two small cephalic points; colour variable; rigidly attached by the tail, so that if the surface is vertical, the pupa. Stands out horizontally." (Davidson & Aitken.)

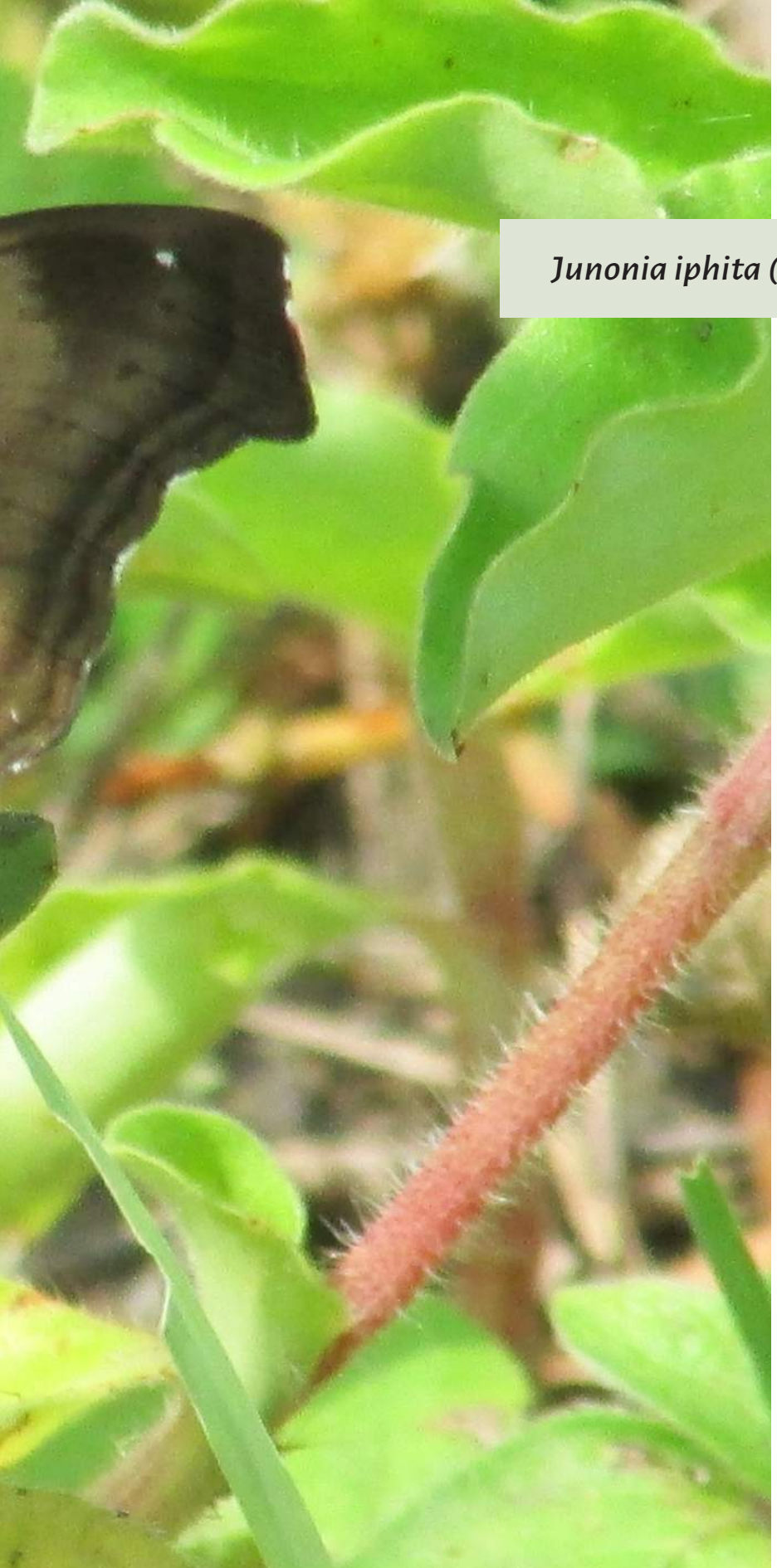
Food-plants: Tragia cannabina and T. involucrata.

Habitat: The northern half of continental India, Simla to Sikhim in the Himalayas, and recorded from Rajputana and Bengal; Assam; Burma; Tenasserim; Malayan Subregion. The Tenasserim specimens are darker and often, without the white subcostal spot in the fore wing, approximating thus to the Southern Indian and Ceylon race.

Wing Span: 45–60 mm.

Larval Host Plants: Ricinus communis, Tragia hispida, T. involucrata, T. plukenetii (Euphorbiaceae).

Distribution: Subspecies: Gujarat to Kerala (entire Western Ghats) and Andhra Pradesh. ■



Junonia iphita (Cramer, 1782)

Chocolate Pansy

Expanse: 56-77 mm. (2.2-3").

Larva: "Cylindrical, slightly pubescent and armed with nine Longitudinal rows of many-branched spines, except on the head which is clothed with short bristles. Colour dark dull brown." (Davidson & Aitken.)

Pupa: "is regular, with three or five dorsal rows of small tubercular points, hung perpendicularly. Colour smoky brown." (Davidson & Aitken.)

Habitat: More or less throughout our limits and extending to China and Sumatra. The ground-colour and even the markings vary very much, some specimens being almost ochreous brown, the ocelli often ochreous-ringed on the underside; the transverse discal fascia on hind wing often with one or two subcostal white spots.

Wing Span: 55–80 mm.

Larval Host Plants: Barleria cristata, Dipteracanthus prostratus, Hygrophila spp., H. auriculata, Justicia micrantha, J. neesii, Ruellia elegans, R. simplex, R. tuberosa, R. tweediana, Strobilanthes spp., S. callosus, S. ciliata (Acanthaceae), Achimenes grandiflora (Gesneriaceae).

Distribution: Peninsular India to Madhya Pradesh.■

Junonia lemonias (Linnaeus, 1758)

Lemon Pansy

Expanse: 56-62 mm. (2.2-2-45").

Habits: Throughout our limits.

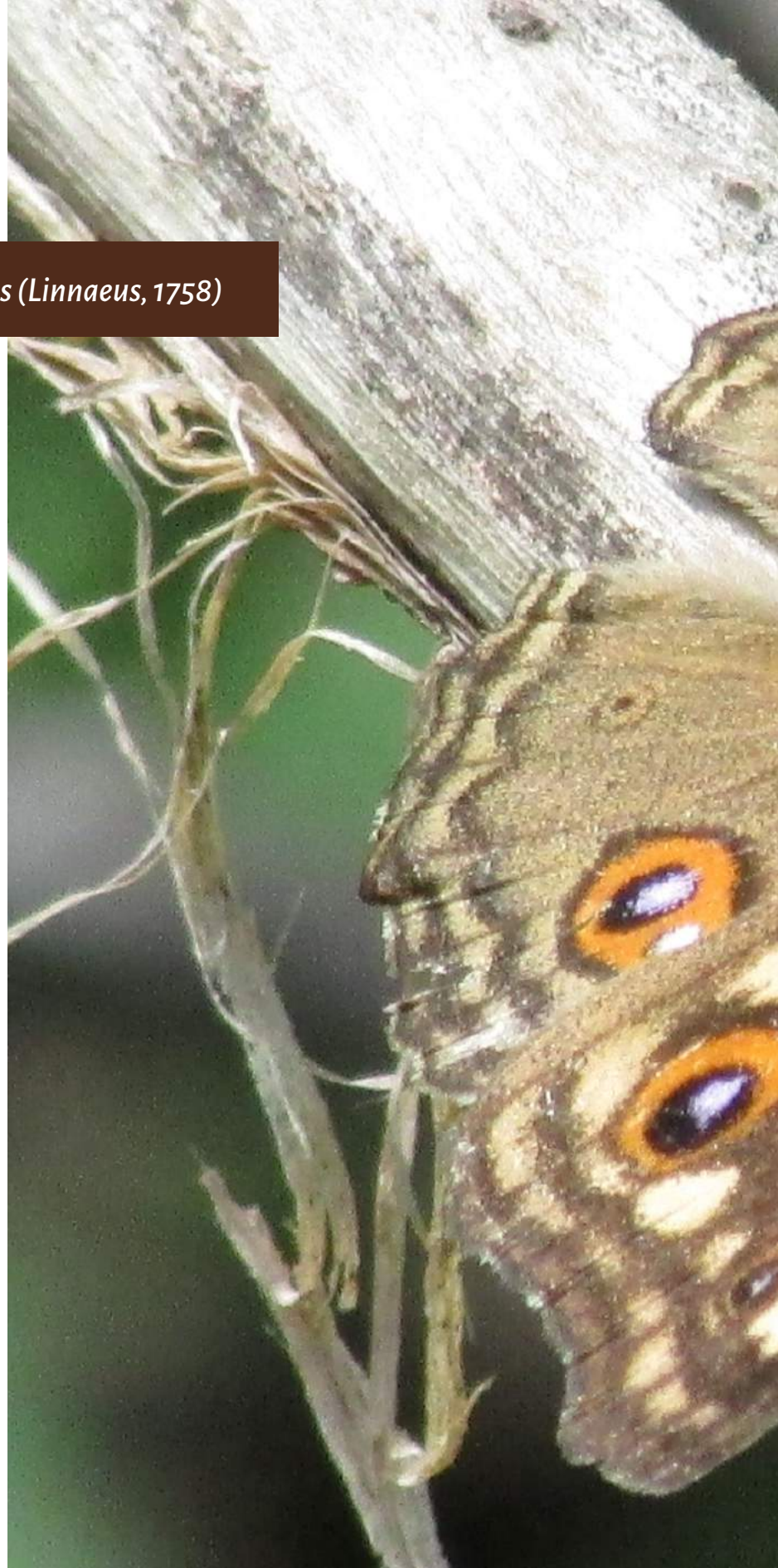
Larva: "After first moult. Black, with four rows of branched spines, abdomen pale brown-black, legs black, head with a transverse yellow band behind; stigmata white. After last moult. Length 1 inch, cylindrical and spiny, lead-colour minutely spotted with darker and whitish dots; head brown, spiny, spotted with black, with a white central triangular patch; anterior portion of first segment yellow; stigmata black." (Capt. Chaumette fide Moore.)

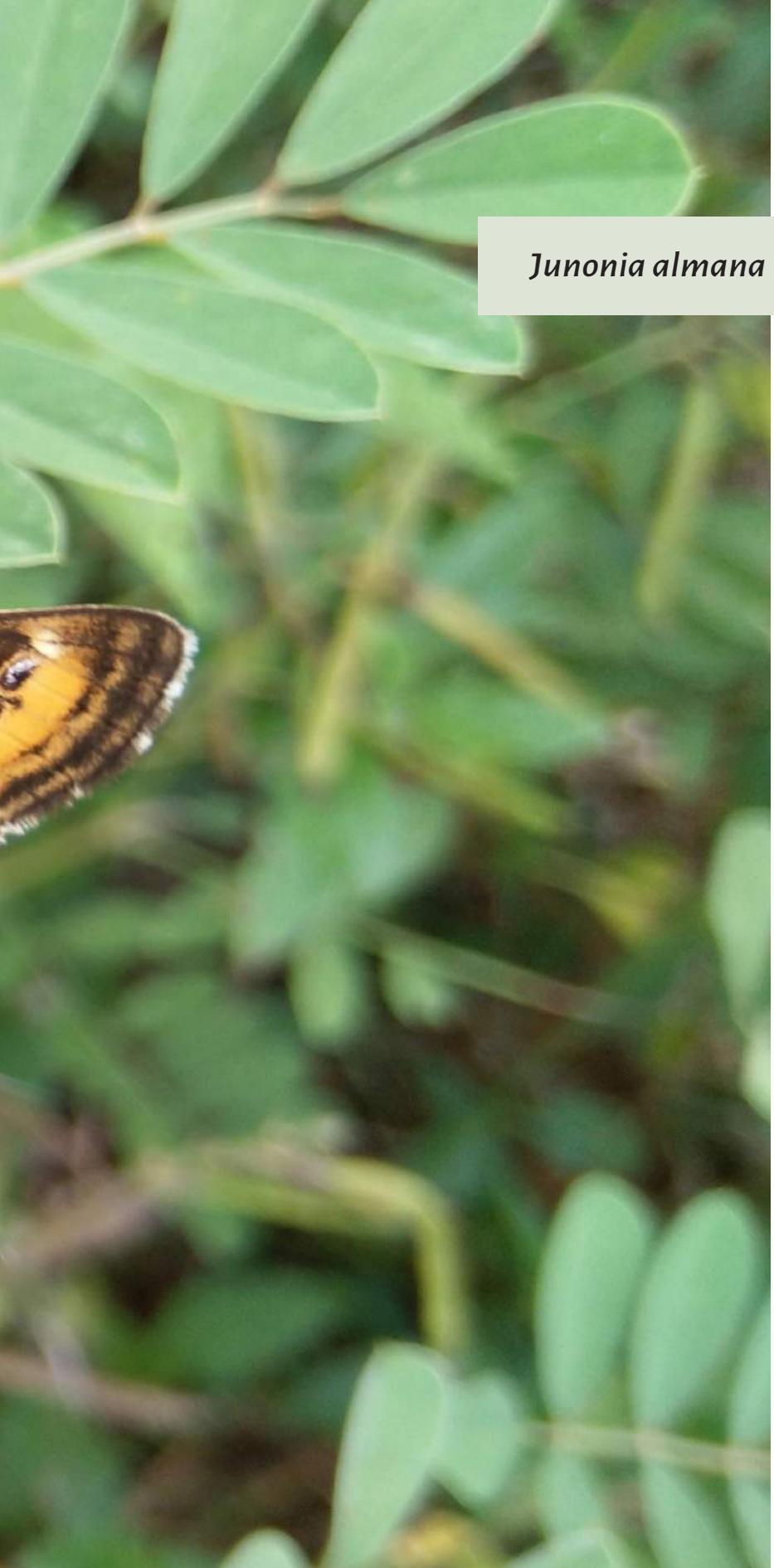
Pupa: "Light brown speckled with whitish and variegated with darker brown." (Capt. Chaumette fide Moore.)

Wing Span: 40–60 mm.

Larval Host Plants: Barleria spp., Hygrophila auriculata, Hygrophila costata, Justicia neesii, Lepidagathis cuspidata, L. keralensis, Justicia procumbens, Nelsonia canescens (Acanthaceae), Cannabis sativa (Cannabaceae), Corchorus capsularis, Sida rhombifolia (Malvaceae).

Distribution: Rajasthan to Kerala and eastwards to Jharkhand. ■





Junonia almana (Linnaeus, 1758)

Peacock Pansy

Expanse: 54-62 mm. (2.13-2.42”).

Larva. “Cylindrical. Head blackish, slightly hairy. Body pale ochreous-brown, with a dorsal, subdorsal and lateral blackish line, and a row of small-ringed spots below· the latter; second segment anteriorly with a transverse reddish stripe; second, third and fourth segments posteriorly with a transverse blackish stripe; second to last segment armed with a dorsal, subdorsal, and tow lateral rows of short, fine-branched spines.” (Moore).

Pupa. “Rather short and thick; head and thorax broad, headpiece pointed beneath; thorax and abdomen dorsally with short tubercular points; colour brownish-ochraceous.” (Moore.)

Habitat: Throughout our limits; abundant in some districts. Found also in the Malayan Subregion, and in China and Japan.

Wing Span: 60–65 mm.

Larval Host Plants: Acanthus spp., Barleria spp., Hygrophila auriculata, Hygrophila costata (Acanthaceae), Gloxinia spp. (Gesneriaceae), Osbeckia spp. (Melastomataceae), Mimulus gracilis (Phrymaceae), Oryza sativa, Pennisetum spp., Pennisetum glaucum (Poaceae), Phyla nodiflora (Verbenaceae).

Distribution: Throughout India including Andaman Islands. ■

Junonia orithya (Linnaeus, 1764)

Blue Pansy

Expanse: 54-62 mm. (2.15-2.45").

Habitat: India; Ceylon; Assam; Burma; Tenasserim; extending to China and the Malayan Subregion.

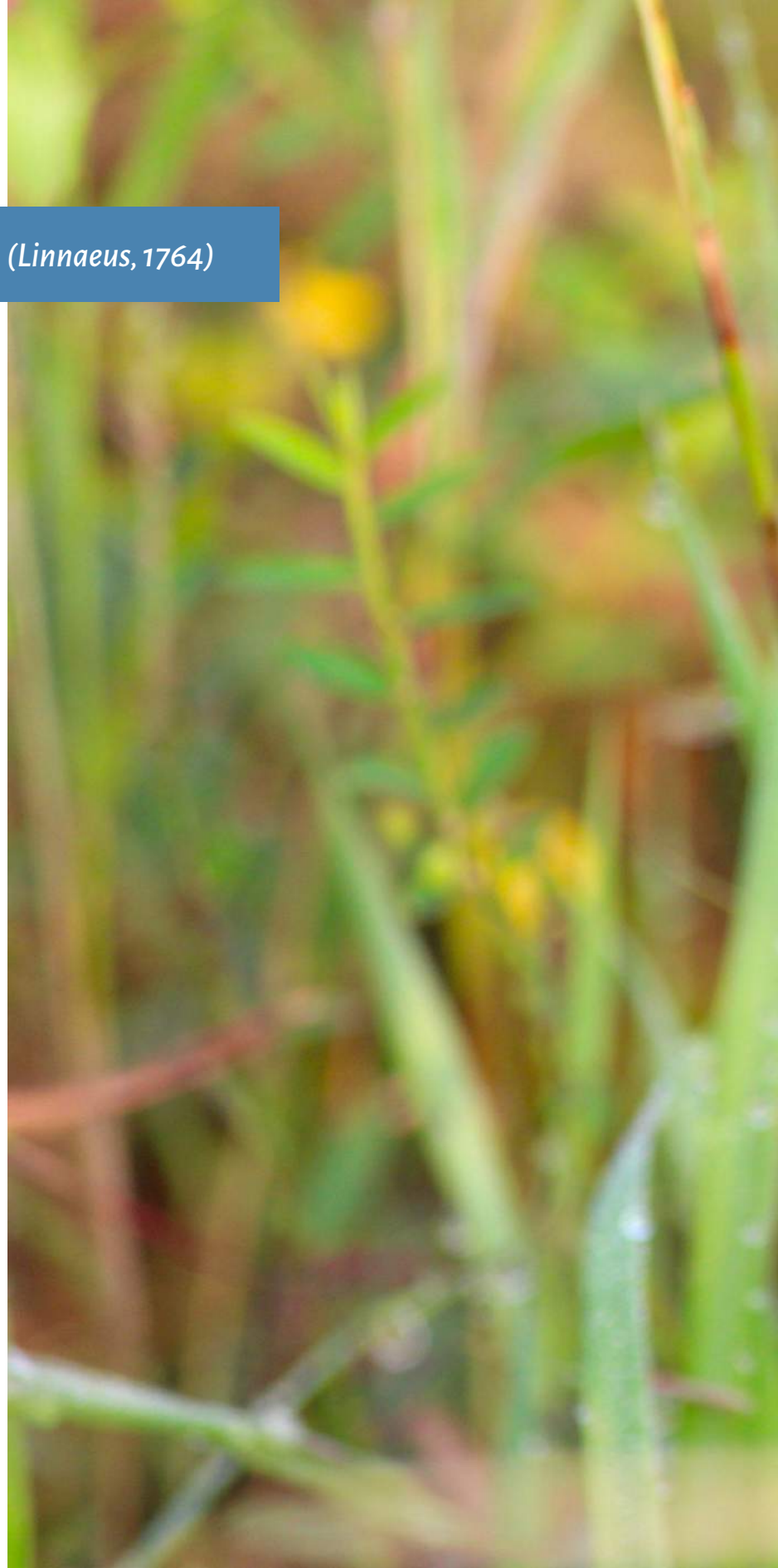
Larva: "Head and body of a very dark shining black shading into brown head on a short neck, latter of an orange colour for a. short distance; caudal extremity also tipped with orange. Body covered with perpendicular spines armed with strong radial hairs Head bifurcated, reddish spot in centre of face, a small spinous process in the angle of each eye". (Forsayeth fide de Niceville.)

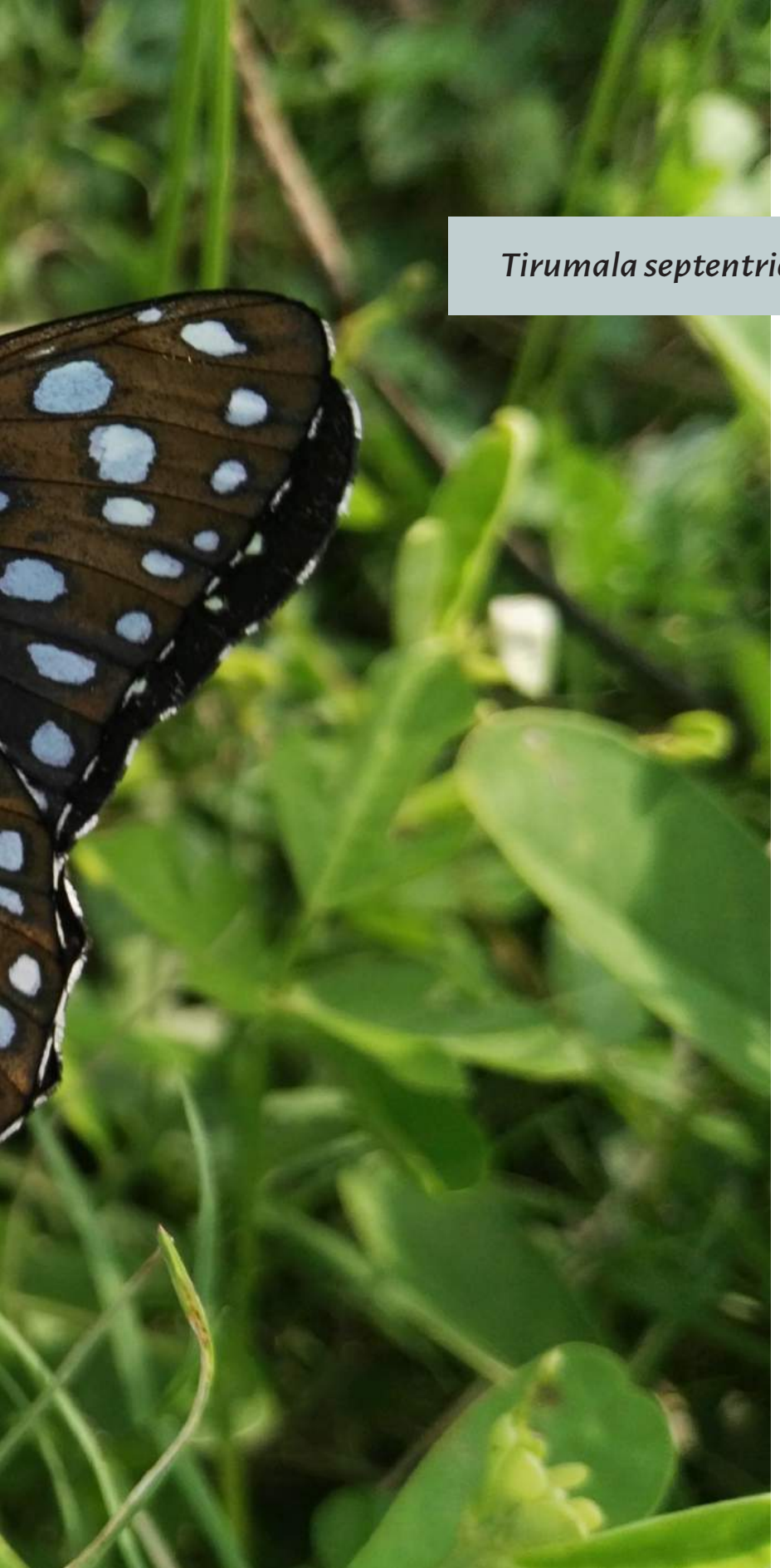
Pupa: Suspended by tail, naked; wing-covers of a muddy yellow; rest of body of a purplish colour variegated by lines of a dull creamy white. Slight projections of an angular nature along abdomen.

Wing Span: 45–60 mm.

Larval Host Plants: Acanthus spp., Barleria spp., B. mysorensis, Hygrophila auriculata, Justicia micrantha, J. neesii, J. procumbens, Lepidagathis keralensis, Nelsonia canescens, Ruellia tuberosa (Acanthaceae), Ipomoea batatas (Convolvulaceae). Mimosa pudica (Fabaceae), Plectranthus scandens (Lamaiaceae), Misopates orontium (Plantaginaceae), Lepidagathis prostrata (Acanthaceae).

Distribution: Jammu & Kashmir to Kerala and West Bengal. ■





Tirumala septentrionis (Butler, 1874)

Dark Blue Tiger

Expanse: 90-105 mm.

Larva: The larva is said to feed on Vallaris dichotoma Wall, family Asclepiadacere, according to MacKinnon and de Niceville, 1897 (Mussooree).

Habitat: Afghanistan; the Himalayas; kulu to Bhutan, Burma, Yunnan, China, Formosa, Hainan, Tong-king, Siam, Malaya and Sumatra; common. According to Adamson (1905), the butterfly is less common in the central dry parl of Burma than is D. limmace.

Wing Span: 75–95 mm.

Larval Host Plants: Vallaris solanacea, Cosmostigma cordatum, Dregea volubilis (Apocynaceae).

Distribution: Gujarat east to Odisha and south to Kerala (entire Western Ghats). ■

Danaus chrysippus (Linnaeus, 1758)

Plain Tiger

Expanse: Sugar-loaf shaped; cream colour." (Chaumette quoted by Moore,. 1890).

Larva: Tentacles as in D. plexippus. Head black, marked with white. Body dark chocolate-brown or black, and clothed. as well as the tentacles, with sparse, short, erect black hairs; spiracular band yellow, composed of contiguous spots shaped like molar teeth, the fangs pointing upwards; spiracles oval and black; a dorso-lateral row of large yellow spots, these absent on segments 2, 13, and 14; between each pair of yellow spots are three or four dorsal white bands, extending to the spiracular band on each side; a small carmine spot at the base of the tentacles on segments 6 and 12, and a yellow spot round the base of the tentacles on 3 and 12 ; segment 2 banded black and white; legs and prolegs black, the latter with a white band on their bases. Length 38 mm, breadth 7 mm, height 6 mm. (From Bell).

Pupa: Green. The ridge of segment 7 'is composed of a double row of beads, and is golden in front and black behind; spiracles rather large, but those on segment 2 are mere slits; headpoints gold, shoulder tipped with gold, and a subdorsal gold spot on hind margin of thorax; cremaster a short, narrow oblong, with hooklets at the extremity, and with ventral extensor ridges; cremaster and extensor ridges black. Length 18·5 mm; breadth, at segment 7, 8 mm. (From Bell). Besides the green pupae there are others which are pale pinkish wax-white. According to Wood-Mason (quoted by Marshall and de Niceville, 1883) the pupa is protected by its resemblance to two different parts of the plant on which it feeds and resides, the green pupae matching the leaves, and the pink ones being of a colour likely to be mistaken by birds, reptiles, and predaceous insects for a blossom.

Habits: The egg is laid singly on the underside of a leaf where the larva lives. The larva eats the egg-shell as its first meal, then the substance of the leaf, leaving the top cuticle, and afterwards feeds from the edge in the ordinary way; it wanders to pupate. It is much attacked by ichneumons. The larva feeds on Calotropis, family Asclepiadacere. Asclepias curassavica Linnaeus, introduced from America, and spread all over India, is also a favourite food-plant.

Imago: The imago is, perhaps, the strongest of the Danaines on the wing. It is a dry weather species in the regions of heavy rainfall. (From Bell).

Wing Span: 70–80 mm.

Larval Host Plants: Asclepias curassavica, Calotropis spp., C. gigantea, C. procera, Carralluma adscendens, Cryptolepis dubi, Pergularia daemia (Apocynaceae).

Distribution: Throughout India. ■

Danaus genutia (Cramer, 1779)

Common Tiger

Habitats: This is a lowland species occurring in disturbed forest edge habitats at elevations between sea level and about 500m.

Lifecycle: The eggs are laid singly on the leaves of Graphistemma, Stephanotis, Asclepias, Cynanchum, Metaplexis, Ceropegia, Gymnema, Marsdenia, Pergularia and Tylophora. The caterpillar is black, marked dorsally with pairs of narrow white transverse dorsal bands, and rows of yellow spots. Below the spiracles there is a broad white broken band, in-filled with more yellow spots. Long black filaments with conical maroon bases project from the 2nd, 8th and 11th segments. These may possibly be used to disseminate pheromones, and may function to ward off predators or parasitoids. The chrysalis is plump, rounded, smooth, and pale green in colour, marked with black dots and flecks of gold and silver. It is suspended by the cremaster from a stem, away from the food plant.

Wing Span: 72–100 mm.

Larval Host Plants: Asclepias curassavica, Ceropegia fantastica, C. hirsuta, C. intermedia, C. lawii, C. vincifolia, Cynanchum callialatum, C. dalhousiae, C. liukiuense, Holostemma ada-kodien, Marsdenia floribunda, M. tinctoria, M. tomentosa, Passularia, Raphistemma pulchellum, R. lemma, Tylophora flexuosa (Apocynaceae).

Distribution: Throughout India. ■

Euploea core (Cramer, 1780)

Common Crow

Expanse: 78-100 mm. (3-4").

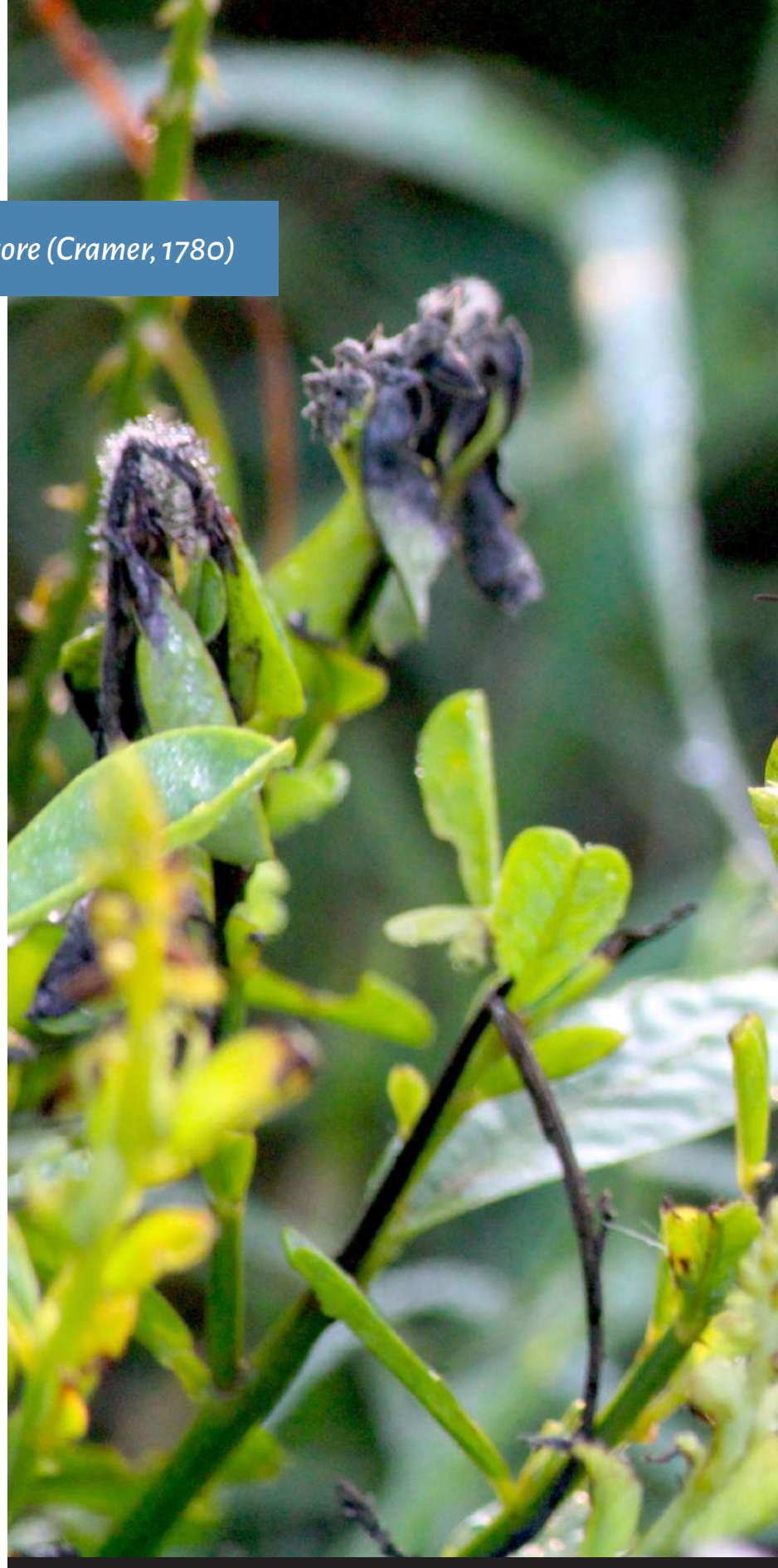
Larva: Above bluish lilac, with a brownish-yellow lateral stripe, and each segment ,with three brownish transverse lines, four pairs of purplish tentaculas, and the spiracles margined with brownish; beneath dark brown. Recorded food plants: the common oleander, Cryptolepis pauciflora, Ficus indica, and Ficus glomerata.

Pupa: "Smooth, rounded, and fulvous, beautifully marked with silvery or golden spots and streaks" (de Niceville). Larva of the race asela, as figured and described by Moore, differs in being of a pale colour and in wanting the brownish-yellow lateral stripes. Food-plant, the oleander.

Wing Span: 85–95 mm.

Larval Host Plants: Adenium obesum, Asclepias curassavica, Carissa carandas, C. spinarum, Cascabela thevetia, Cryptolepis dubia, C. sinensis, Hemidesmus indicus, Holarrhena spp., Ichnocarpus frutescens, Nerium spp., Nerium oleander, Tylophora indica, Wrightia antidysenterica (Apocynaceae), Ficus spp., F. benghalensis, F. drupacea, F. pumila, F. racemosa, F. religiosa, Streblus asper (Moraceae).

Distribution: Throughout India. ■



Acraea violae (Fabricius, 1775)

Tawny Coster

Habitats: 50-65 mm. Early stages and habits (from Bell, 1910).

Egg: Dome shaped, with seventeen raised, transversely striated, longitudinal ridges, not meeting at the top; top shallowly reticulate.

Larva: Body cylindrical, with segments well marked; anal segment high, flap rounded at extremity, not overhanging the claspers; prolegs long. Head small, round, set with erect hairs, brownish-orange; clypeus triangular, the apex black; a black spot at base of each cheek. Segment 2 with a subdorsal spine; segments 2 and 3 with a lateral spine on their common margins; segment 3 with a subdorsal spine, and a lateral one on the common margin of 3 and 4; segment 4 with a subdorsal spine; segments 5 to 12 each with a subdorsal, a supraspiracular, and a subspiracular spine; segment 13 with a subdorsal spine, and 14 with a dorsolateral one; also on segments 3 to 10 there is a small bristle-bearing chitinous area ,under the subspiracular spine. All spins shiny black, set with erect, stiff, black hairs arising from thickened bases; all of about equal length, excepting those on segments 2, 3, 13 and 14, which are slightly shorter. Colour of body' a greasy claret-brown, with segments 2 and 14 yellow-reddish.; dorsal parts of segments 3, 4, 11, and 12 yellow; venter greenish-yellow; legs shiny black; soles (plantae) of prolegs green; a shiny black shield on base of prolegs. Length, 21 mm.; breadth (including spines), 10 mm. ; length of spines, 3 mm.

Pupa: Elongate; head with two blunt points; anal end bluntly rounded; shoulders prominent; cremaster short and stout. Surface dull, very slightly wrinkled, and set with minute erect hairs. Colour white, with a pink and a yellow shade in it; segments 2 to 5 with a subdorsal broad and interrupted black line, coalescing at the hind margin of the last segment, the extremities in front being joined by a straight line on vertex of head; dorsal space between these lines on segments 3 and 4, reddish-yellow; abdomen with a broad subdorsal line, a similar spiracular line, and a central ventral line, all black; each of these lines or bands encloses a reddish-yellow circular spot near front margins of segments, these spots ,(except the ventral ones) being the scars left by the larval spines; last segment and cremaster black; tips of head points, sides of head, shoulders, antennae, and greater part of proboscis also black; wings margined black, with a central bifurcate black mark, and short subapical line to each; all black markings dull. Length, 17 mm; breadth, 6 mm. at broadest part.

Habits: The eggs are laid in a batch, up to 15 or so, on a young shoot or tendril. Larvae at first gregarious, but separate in the third stage; very active, and grow fast; generally rest on underside of a leaf; usually pupate on or near the food plant. Both larva and pupa have a disagreeable odour. Food-plant, in the damper parts, the wild passion-flower, Modecca palmata Lam. (family Passifloreae); also cultivated forms. In Bombay the butterfly is to be found at all seasons, in the mountains and plains, forests and open country; not uncommon in Sind. Flight weak, slow and fluttering, the wings never being moved far from the horizontal. The insect keeps near the ground and goes straight ahead.

Habitat: Ceylon and peninsular India; common.

Wing Span: 50–65 mm.

Larval Host Plants: Passiflora spp., P. edulis, P. foetida, P. subpeltata, Turnera subulata, T. ulmifolia (Passifloraceae), Cucurbitaceae, Hibiscus cannabinus (Malvaceae), Adenia hondala, Aporosa cardiosperma (Phyllanthaceae), Vitex pinnata (Lamiaceae).

Distribution: Throughout India; Lakshadweep Islands. ■

Ariadne ariadne (Linnaeus, 1763)

Angled Castor

Expanse: 52-56 mm. (2.05-2.21").

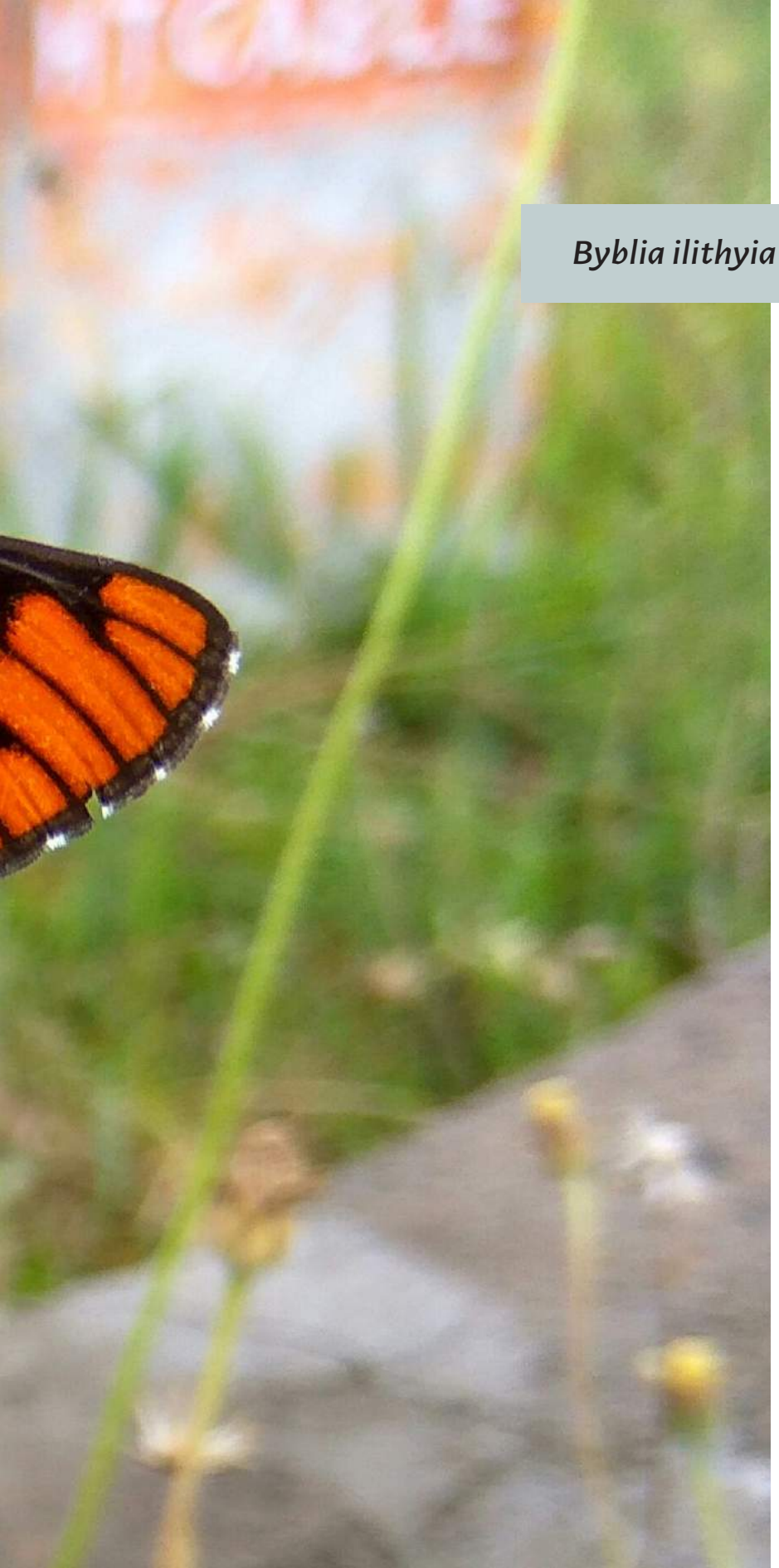
Habitat: Throughout continental India, but not, so far recorded from further west than Mussoorie in the Himalayas or from the Punjab; Ceylon; Assam; Burma; Tenasserim; extending to China and the Malayan Subregion. Larva: "Cylindrical, slender; two dorsal rows of sharp spines with three or four fine branch spines springing from a point in the middle of each; two rows of similar but shorter spines on each side; one pair of long, strong and straight spines on the bead, irregularly set with small spines, which cluster at the end; colour variable, sometimes green with longitudinal dark brown lines, or dark brown with an interrupted broad dorsal stripe of pure white, not extending to either end." (Davidson & Aitken.)

Pupa: "Slender, wing-eases somewhat dilated, a dorsal protuberance and two small cephalic points; colour variable; rigidly attached by the tail, so that if the surface is vertical, the pupa. Stands out horizontally." (Davidson & Aitken.)

Wing Span: 45–60 mm.

Larval Host Plants: Ricinus communis, Tragia hispida, T. involucrata, T. plukenetii (Euphorbiaceae).

Distribution: Peninsular India from Gujarat and W. Bengal to Kerala (entire Western Ghats). ■



Byblia ilithyia (Drury, 1773)

Spotted Joker

Dry-season form: Males and females are similar to the wet-season form but the black markings are not so sharply defined. Underside: ground colour darker, on the hindwing a dark ochraceous; the transverse subbasal and discal bands in both sexes white.

Wing span: 50–56 mm. The haploid chromosome number is 17.

Distribution: Parts of Africa, central and southern India, and Sri Lanka.

Larval Host plants: The larvae feed on Tragia involucrata, Tragia plukenetii, Tragia dubanensis, Tragia glabrata, Dalechampia capensis, and Tragia cannabina. ■

Badamia exclamationis (Fabricius, 1775).

Brown Awl

Egg: The brown awl lays many eggs on a single plant, one at a time, on the tips of fresh shoots. The dome-shaped egg is pale green with longitudinal ridges having fine beadings; a total 13 ridges in all.

Larva: The larva is a pale violaceous (violet) yellow, with numerous black transverse dorsal lines; the prolegs are whitish encircled with black. The head is yellow, approximately heart shaped, with a black band and many tiny black spots. On hatching the larva webs the edges of leaves together with silk to form a roomy cell from a leaf in which it resides throughout the larval stage. When disturbed, it can move quite briskly and even drop off. The caterpillars of the brown awl grow faster than most of those of other families, and have moist, sticky droppings. At the time of pupation they descend close to the ground, looking for suitable spots to pupate. The caterpillar constructs a tubular cell from a leaf by drawing the edges together with thick strands of silk. In this cell, the caterpillar prepares an extensive silk bed on which it sits awaiting pupation. The freshly formed pupa clings onto the silken pad almost immediately.

Pupa: The pupa is stubby, with protruding eyes and a prominent projection on the head in between them. The pupa may be light brown or violaceous. The body tapers away from the shoulders towards the rear. The abdomen is creamish with a row of four black spots on each side. The pupa is shiny, but plastered with a white powder.

Wing span: 50–55 mm.

Larval Host Plants: Anogeissus acuminata, Combretum albidum, C. latifolium, C. ovalifolium, Terminalia bellirica (Combretaceae), Hiptage benghalensis (Malpighiaceae), Ficus spp. (Moraceae), Chionanthus purpureus (Oleaceae).

Distribution: Throughout India. ■

Hypolimnas misippus (Linnaeus, 1764)

Danaid Eggfly

Expanse: 70-93 mm. (2.75-3.66”).

Larva: Capt. H. L. de Ia Chaumette (teste Moore) describes this as cylindrical, black, with a darker black dorsal line, banded transversely with pale brown transverse tuberculated small spots beneath dark olive-brown; legs and head brick-red; head furnished with two long black thick branched spines; the rest of the segments except the anal with ten branched spines, dirty, transparent white in colour and disposed in longitudinal rows, anal segment, with two similar spines. Food-plant, Portulaca oleracea.

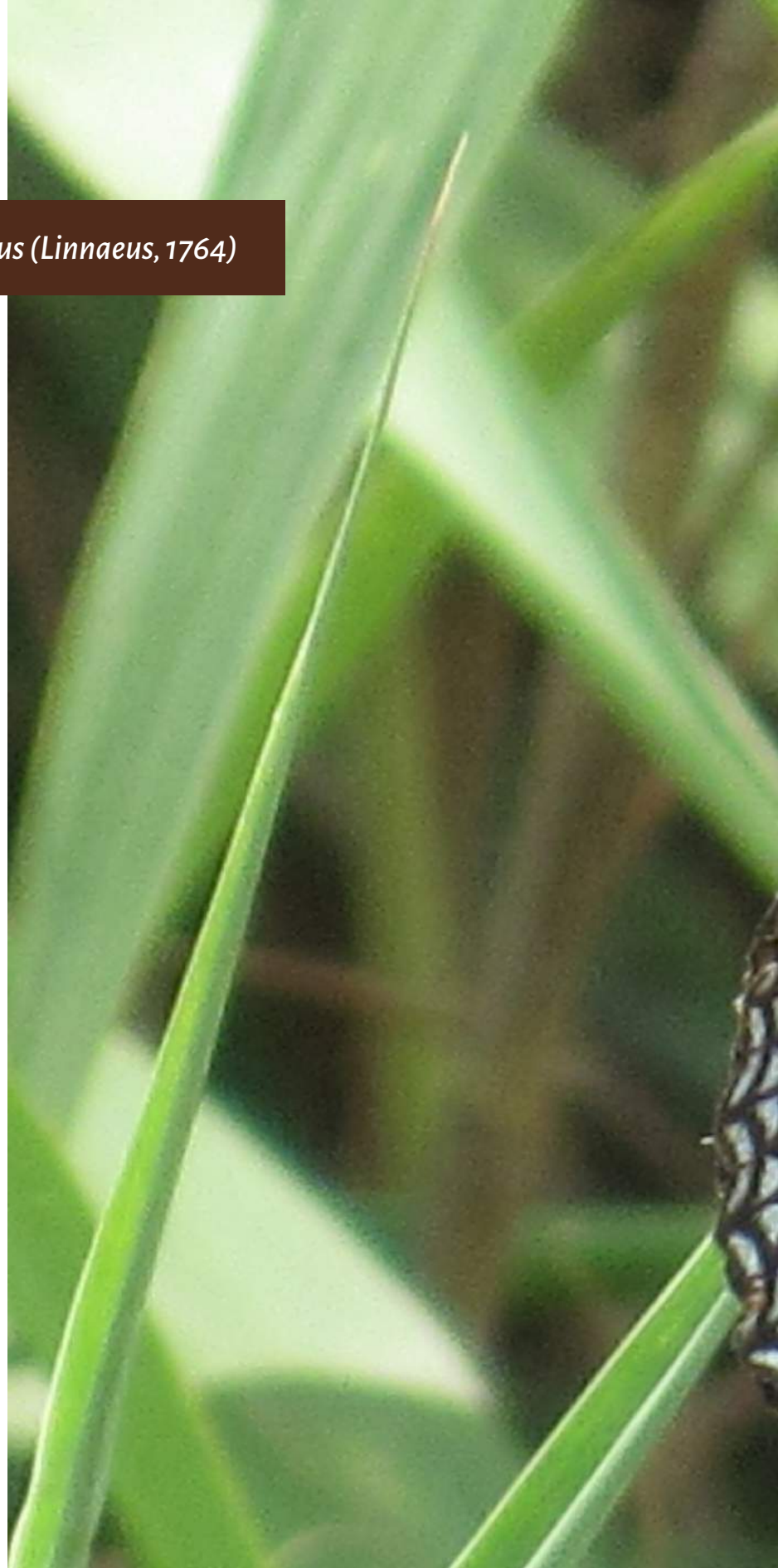
Pupa: “Pendulous. Short and thick; light brown, without metallic spots, variegated and streaked with bistre, particularly towards the head and tai1.”(De la chaumette)

Habitat: Throughout our limits; in the Himalayas up to 6000 feet; extending to the Malayan Subregion and China.

Wing Span: 70–85 mm.

Larval Host Plants: Asystasia gangetica, A. lawiana, Barleria cristata, Justicia betonica (Acanthaceae), Ipomoea carnea (Convolvulaceae), Abelmoschus, Abutilon spp., Hibiscus spp., Sida cordifolia (Malvaceae), Portulaca oleracea, P. pilosa (Portulacaceae).

Distribution: Throughout India, including Andaman & Nicobar Islands. ■



BUTTERFLY GARDENING

IN CUTN CAMPUS

Butterfly garden will attract a variety of butterflies belonging to different species at one place and in good numbers. The environment is made as conducive as possible for butterflies found in the area. The CUTN campus is one of potential place for setting up of butterfly garden, as the campus having a wide varieties of plant species. There is a proposal for developing biodiversity park as well as butterfly garden within the CUTN campus. It is a good sign that School of Life sciences and other departments conducting many programs that related to nature conservation that may lead to a biodiversity park.

Understanding the life cycle of butterflies is an important science for butterfly gardening. Butterfly life cycle completes in four stages, egg, caterpillar (larva), pupa (chrysalis) and adult butterfly. Every butterfly lays its eggs on one few selected species of plants, which are called larval host plants. The caterpillars emerge from these eggs and feed voraciously on the leaves or these larval host plants. The caterpillar moults few times and stops eating after certain growth and gets metamorphosed into a pupa. After few days, an adult butterfly emerges from this pupa. That means butterflies need the larval host plants on which their caterpillars will grow and food for the adult butterflies on which they will survive.

Landscaping for butterfly garden: Setting up of the open butterfly garden, the best location will be near a patch of forest, as the butterflies can be attracted to the garden by fulfilling the necessary requirements. However, it is not necessary to have big plot to attract butterflies to the garden. Even a small plot can be converted into a decent butterfly garden. Landscaping should be in such way that there are places which provide shade, lot of sunshine, and wet patches too. The CUTN residential campus is the ideal place for butterfly garden as there is a much of trees than the academic complex.

Larval Host Plants (LHP)

In order to complete the four stages of butterfly life cycle, and each butterfly species lays its eggs on a specific plant or a choice of few species of plants. The larva (or caterpillars) feed on these plants and hence these plants are termed as larval host plants (LHP). For example the striped tiger and common tiger butterfly lays its eggs on Crotolaria retusa, Spot Swordtail, Common Jay and Tailed Jay lays their eggs on Polyalthia longifolia, Commom Mormon lays its eggs on Murraya koenigii (Curry Leaf) and Citrus aurantifolia (Lime tree). The caterpillar which feeds on the LHP metamorphoses into a pupa in due course of time. The pupa is generally well camouflaged and stays immobile till an adult butterfly emerges out of it.

The more is the diversity of the larval host plants in the butterfly garden the more number of butterfly species will start breeding in the garden. And there are more chances of the butterflies staying back in the area if they can fulfil all their requirements in the area. Hence, as a part of developing the butterfly garden, it is a continuous process to find out more and more larval host plants and plant or grow them in the garden. It is important to have better understanding among the staff (at least the gardener) of the butterfly garden to prevent uprooting of the larval host plants, mistaking them to be useless weeds. This is important in view of the fact that some butterfly species lay their eggs on grasses.

Attracting 'nectar-loving' butterflies

Butterflies do not have teeth they cannot eat solid food. Butterflies can only sip liquid food with the help of a very thin tongue, called proboscis. And they do not grow once they are borne, they do not need a diversity of food for physical growth. What they need is liquid food which is rich in energy and acts like fuel for maintenance of their life activities, including flight and reproduction. The best energy-rich food available around us is the nectar in flowers. The other sources of liquid food are rotten fruits and dead animals love the nectar of flowers. These butterflies are attracted to the flowers due to their bright colours. Hence it is necessary to plant plots of flowering plants in the garden. The flowering plants should be selected carefully in such a way that throughout the year the garden has some plants flowering. Some of the common plants which attract lot of butterfly species for nectaring are Lantana spp., Jamaican Blue Stachytarphaeta spp., Cockscomb Celosia spp., wild Xenia spp. and Ixora species. A small herb Tridax indica attracts lot of blue (Lycaenid) butterflies for nectaring.

Every butterfly has its own choice of flowers it visits, due to the fact that the length of their proboscis varies in different species. Butterflies with short proboscis may not be able to sip nectar from flowers with a long tubular corolla. Some skippers have extremely long proboscis and hence can sip nectar from flowers with long tubular corolla. Many large sized swallowtail butterflies are not able to sip nectar from very small flowers as the flowers cannot bear their weight. Hence some of the swallowtails do not land on the flowers and keep fluttering while nectaring. Thus we need to a have a diversity of flowering plants in the garden to cater to the needs of the various species of butterflies. Also while planting the flowering plants, they should be planted keeping in mind their expected height to which they will grow. This will provide a vertical dimension to the garden. Small plots of flowering plants of a particular species should be planted, thus adding to the aesthetic value of the butterfly garden, besides attracting hordes of butterflies.

Attracting the 'non-nectar-loving' butterflies

It is a wrong notion that all butterflies love nectar in flowers. There are many species of butterflies (many belong to the brush-footed and brown butterflies) which never visit a flower. These butterflies like to get their stock of food from rotten fruits, decaying fish, crabs, or prawns, the scat or dung or urine of wild animals and so on. These butterflies locate the food because of the strong smell. Some of the butterflies which are attracted to these include the Common Nawab Polyura athamas, Anamolous Nawab Charaxes agrarius, Black Rajah Charaxes solon, Tawny Rajah Charaxes bernardus, Blue Oakleaf Kallima horsfieldii, Orange Oakleaf Kallima inachus, Common Baron Euthalia aconthea, Gaudy Baron Euthalia lubentina, Common Evening Brown Melanitis leda, Angled Castor Ariadne ariadne, Common Palmfly Elymnias hypermnestra and many bushbrowns Mycalesis spp.

Rotten fruits can be kept in feeding trays in the butterfly garden to attract these butterflies. These feeding trays with rotting fruits may attract ants, which in turn will disturb the butterflies. To manage this problem, each feeding tray should be kept in another slightly larger tray filled with water. This will prevent ants to reach the bowl with fruits, creating a moat-like situation like a. The feeding tray can also be kept hanging in trees at various locations in the garden. Rotten or overripe fruits of Pineapple Ananas comosus, Custard apple Annona reticulata, banana, guava and Sapota (Sapodilla or chikoo) Manilkara zapota are useful in attracting butterflies.■

Attracting 'alkaloid-loving' males

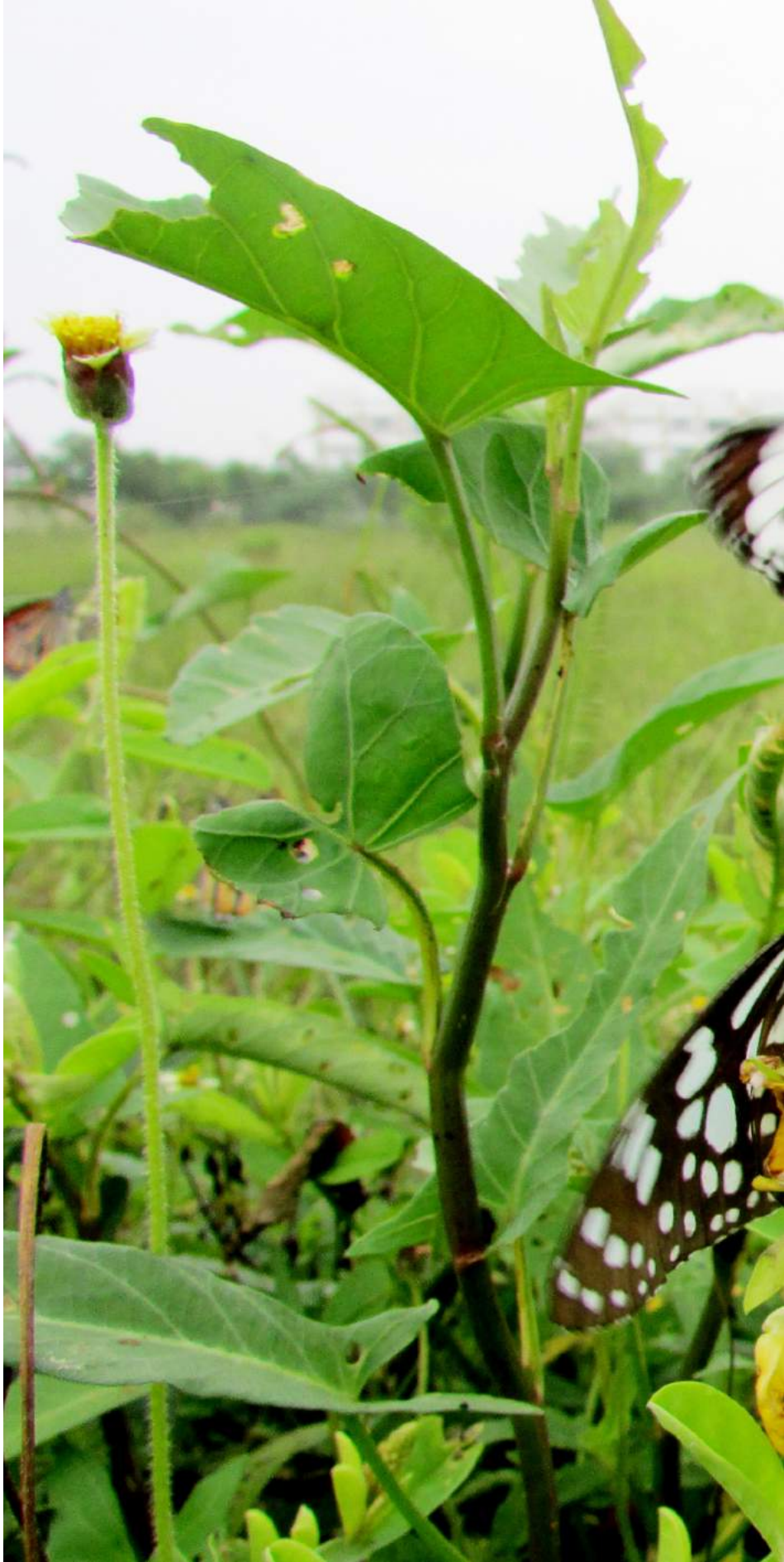
Males of some butterfly species need specific alkaloids for reproduction. These alkaloids are provided by plants like Rattlepod Crotalaria, Turnsole Heliotropium, and Eupatorium species. The male butterflies flock these plants in huge numbers to suck these alkaloids and is a pleasant sight to see the butterflies engrossed in the activity. They need these chemicals to synthesize sex pheromones to attract females. Developing small plots of these plants ensure flocks of butterflies especially the tiger butterflies namely, Blue Tiger Tirumala limniace, Glassy Tiger Parantica aglea, Dark Blue Tiger Tirumala.

Milkweed butterflies like Tigers and Crows are attracted towards Crotalaria to get alkaloids by Raju Kasambe septentrionis, Plain Tiger Danaus chrysippus, Striped or Common Tiger Danaus genutia, Nilgiri Tiger Parantica nilgiriensis and the crow butterflies namely, Common Indian Crow Euploea core, Brown King Crow Euploea klugii. These are also called brush-footed butterflies.

Attracting 'mud-loving' butterflies

In the landscape of the butterfly garden, if there is natural depression it should be watered more often to create a muddy spot and a wet patch. Plastic sheets can be buried under this muddy spot to manage to moisture level. Fine sand should be spread along the fringe of his muddy place and rotten leaf litter be mixed in the soil from time to time. Many butterflies (especially males of many species) visit such damp and muddy places to get their daily dose of water, minerals and various chemicals needed for their physiological needs. This is known as 'mud-puddling'. Yellows of many species gather on mud for mud-puddling in huge numbers.

Also, before planting the plots of plants, a permanent arrangement for watering the plants should be done. This could be the sprinklers or other methods, which will save lot of manpower in future needed to water the entire garden nearly every day.■



ANURANS

Anurans play a very important role in maintaining a healthy ecosystem, and diversity of anurans is a good indicator of environmental well-being (Trishala et al., 2016). Anurans are sensitive to changes in the quality of natural ecosystem (Crump 2010). Anurans play a key role in the structure and functions of the ecosystem, nutrient cycling and predatory changes in the food web (Daniel & Kimberly 2014). The CUTN campus is characterized by riverine freshwater wetland with varied microhabitat types. An inventory of anurans within CUTN was undertaken from September, 2017 to December, 2018 within her 516.76 acres land stretch. ■

Chapter-3

Hoplobatrachus crassus (Jerdon, 1853)

Jerdon's Bullfrog

Description: A large frog, snout-vent lengths of males: 60-90 mm and females: 70-135 mm. The color is dorsally olive or yellow with dark brown to black spots. Ventral color is white to yellowish. A yellow vertebral stripe is prominent in some specimen. This species looks very similar to H.tigerinus.

Distribution and Habitat: Bangladesh, India, Nepal and Sri Lanka. H. crassus is found in Sri Lanka (the largest frog in the Island), southeastern India, Uttar Pradesh, Nepal. H. crassus is semiaquatic, common along rivers, reservoirs and marshes. H. crassus is found up to 460 m asl. H. crassus is active at night, looking for food. H. crassus can often be seen after heavy rains, when mating begins. The males call from watersides. The tadpoles are very aggressive towards other tadpoles. ■

Kaloula pulchra (Gray, 1831)

Asian Painted Frog

Description: K. pulchra ranges in size from 54-70 mm SVL for males, and 57-75 mm SVL for females. The body is stocky, with a small head and short, rounded snout. This frog will inflate itself when threatened. The dorsum is dark brown, sometimes with irregular yellowish-brown spots. A narrow dark lateral stripe is present from the rear of the eye almost to the groin. This lateral stripe is separated from the mid-dorsal dark brown coloration by a thick yellow or orange stripe, which may itself be punctuated with several spots. The belly is mottled dirty yellowish brown. Males have a black throat.

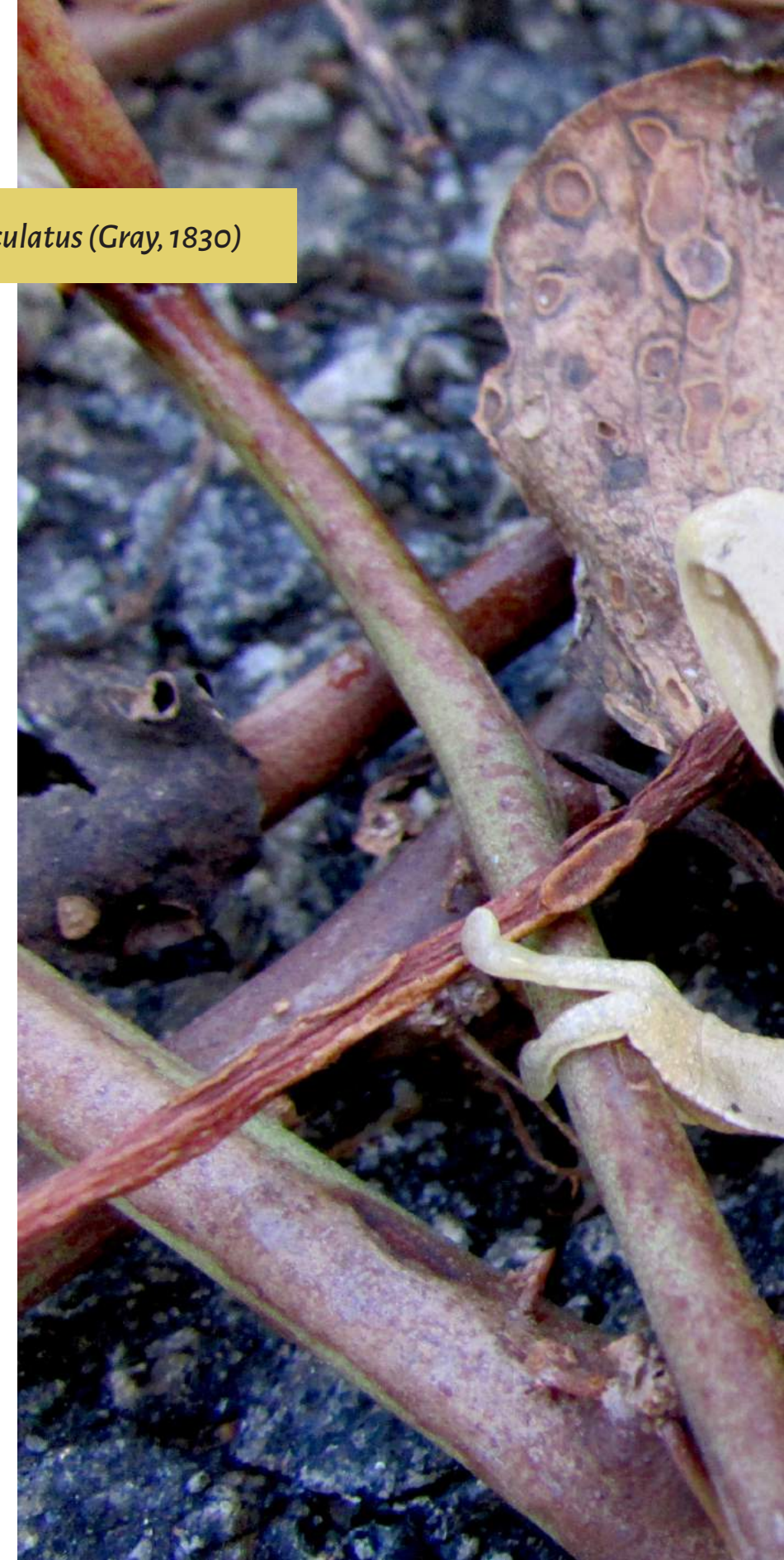
Distribution and Habitat: Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Singapore, Thailand, Vietnam. Generally breed during rainy season; males are usually heard during and after rainfall. They otherwise hide under burrows or vegetation and are nocturnal (Emerson 1976). Calls can be given while males float on the water surface. Calling is usually in chorus; however, adjacent calling males may alternate their calls (Kanamadi et al. 2002). These frogs prey on ants (Berry 1965). K. pulchra can exude highly sticky secretions, which are most likely used to deter predators (Evans and Brodie 1994). These secretions are noxious but does not contain detectable levels of toxins (Daly et al. 2004). ■

Polypedates maculatus (Gray, 1830)

Common Indian Tree Frog

Description: Snout-vent length of mature males 34-57 mm, females 44-89 mm. Dorsum smooth, chin and chest smoothly granular, venter and underside of thigh granular. Males with single internal vocal sac and nuptial pad at base of first finger. Dorsum olivaceous to chestnut, sometimes brownish-yellow or grey with scattered dark spots; loreal and temporal regions dark brown or black; limbs with dark cross-bars. Hinder side of thighs with round yellow spots which are usually separated by a dark brown network (Daniel 2002).

Distribution and Habitat: Bangladesh, Bhutan, India, Nepal, Sri Lanka. Sexual maturity is attained at a SVL of 35 mm in males and 41 mm in females. Breeding-time is the monsoon season. The call of the male frog is heard after sunset. Amplexus is axilliar, with males holding females at the level of the armpit. The foam-nest is semiglobular in shape with a flat bottom attached to the substrate. Fresh foam is white, becoming dirty white or brown. Trees overhanging water tanks and pools are used as spawning sites. Size of foam-nest: 65-92 mm in diameter, eggs are pure white and 1.2-1.5 mm in diameter; up to 850 eggs in a single foam-nest. Tadpoles take 55 days for complete metamorphosis, feeding on desmids, diatoms and algae. ■



Uperodon variegatus (Stoliczka, 1872)

Termite Nest Frog

Description: Maximum snouth-vent length 35 mm, females are slightly bigger than males. The colour of the dorsum is dark brown with irregular light brown and whitish dots on feet and fingers. The author found mature males with creamish coloured parts on the dark brown ground color (see photos). The belly is whitish.

Distribution and Habitat: India. R. variegata is nocturnal, and is most easily found after heavy rain when mating begins. Males call from watersides, but it is very difficult to locate calling individuals, as they remain hidden amongst vegetation. After the rainy season this species can be found inside houses, especially swimming in toilets. During the drier season this species is very difficult to find. ■

Duttaphrynus melanostictus (Schneider, 1799)

Asian Common Toad

Description: Head with distinct rostral, preorbital, supraorbital, postorbital and a short orbito-tympanic, cranial crests; no temporal ridge; interorbital space much broader than upper eyelid; tympanum very distinct, at least two third the diameter of the eye; first finger generally but not always extends beyond second; double subarticular tubercles only under third finger. Toes with single subarticular tubercle; parotid elliptical, with dark brown scattered branching concretions; skin heavily tuberculated on flanks, tubercles usually tipped with dark brown spines; a lateral dorsal staggered row of 8-9 enlarged tubercles; cranial crests, lips, digit tips, metacarpal and metatarsal tubercles are cornified with dark brown, which tend to peal off in preserved specimens; head is almost smooth. Recently, Khan (2001) has distinguished Pakistani population of this toad as a new subspecies Bufo melanostictus hazarensis, on the basis of kidney shaped parotid glands; double subarticular tubercles under penultimate phalanx of all fingers; rostral ridge absent from head; temporal ridge present; light brown dorsum. Color: Dorsum uniform gray of various shades, brown or reddish with dark spots, ventrum uniform dirty white, speckled with light brown on chin and throat. The throat of breeding male is light orange or yellow. It develops cornified pads on inner side of first and second fingers.

Distribution and Habitat: Country distribution from Amphibia Web's database: Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Hong Kong, India, Indonesia, Lao People's Democratic Republic, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam Malaysian region, Peninsular Malaysia, Sabah, Sarawak. ■

Hoplobatrachus tigerinus (Daudin, 1802)

Indian Bull Frog

Description: H. tigerinus has a slightly longer than wider head. In older specimens it is wider; snout-pointed, projecting, canthus obtuse; loreal oblique, slightly concave; inter orbital space much narrower than the upper eyelid; tympanum distinct, almost as large as the eye; fingers obtusely pointed, first longer than second; tibiotarsal articulation reaches eye or between eye and the naris; toes obtuse, with slightly swollen tips, entirely webbed, feebly emarginated; outer metatarsal tubercle separated nearly to its base; subarticular tubercles small, a dermal fold along outer border of the fifth toe, inner metatarsal tubercle small, blunt and compressed; dorsum smooth or granular, with 6-14 longitudinal broken folds, occasionally interspersed with smooth tubercles, ventrum smooth; forelimbs of breeding male are thick, first finger is swollen, with grayish-brown velvety horny layer at its base, blue vocal sacs are located on sides of the throat.

Color: Dorsum olive green, olive or gray, with dark blotches, a light yellow vertebral streak, rarely absent; a dark canthal and a lighter labial streak often present; limbs with dark bars, which may break in dark blotches; thighs posteriorly marbled with black and yellow; a fine yellow line along upper surface of thigh, another on the inner side of calf. Ventrum white, at times feeble pigmentation on throat (Khan and Tasnim 1987b). The tadpole of H. tigerinus has a cylindrical body, which does not bulge out; tail is muscular, almost as broad as body, fins are narrow, parallel, tail tip is acutely pointed. Anterior oral disc, with non papillated rim. Posterior labium extensible into an additional postdisc sucker. Beak strong, prebuccal half of it is strongly serrated, medially produced into a long serrated tooth, while postbuccal half is sharp, nonserrated with a median recess to receive the median tooth of the prebuccal half. The labial tooth row formula is 5(4)/5(3), teeth are biserial in arrangement. A tooth is a 0.3-0.4 mm long cylindrical body, with a gradual taper toward acute tip (Khan 1991a, 1996b). The tadpole is predominantly carnivorous and feeds primarily on sympatric tadpoles and bodies of drowned animals (Khan 1996b). It is benthic in habits, eyes and nostrils are dorsally placed. It stalks its prey, while lying at the bottom of water, darting to catch it in its powerful jaws. Melanophores are concentrated just below eyes, and along dorsolateral sides of body; tail and fins are speckled with black, tail tip heavily pigmented. Total length of the tadpole 40-43 mm, tail 23-26 mm. A very large semiaquatic frog, measuring up to 170 mm. Dorsally, greenish or brown with dark spots and often a light vertebral line. Ventrally whitish. Males become yellow in the breeding season. Skin with longitudinal rows of tubercles. Hands without webbing, feet more or less fully webbed. Males with nuptial pads on first finger and paired lateral vocal sacs. ■

REPTILES

The riverine freshwater wetland in CUTN campus are very fragile and harbor a treasure of biodiversity. The CUTN ecosystem forms an important environment for aquatic, semi-aquatic, grassland, dry land and moisture loving floral and faunal associations. The campus ecosystem play an integral role in the ecology of a watershed. Their shallow waters, edaphic factors and climate conditions are ideal for organisms that form the base of the food web upon which many species of flora and fauna depend. The campus ecosystem provides the necessary food, water and shelter for mammals, migrating birds, amphibians and reptiles.

Reptiles play an important role as primary, midlevel, and top consumers in an ecosystem which maintains the ecological food chain in many ecosystems, their diet of insects and small rodents contribute to control of these animals that are often thought of as pests in crops and homes. In considering climate and the vegetation types, the CUTN campus seems to be attracted huge number of reptile's species. ■

Chapter-4

Vipera russelli (Shaw 1797)

Russell's viper

Egg: This species is characterized by having an obtuse snout with prominent canthus rostrails; nostril is very large, pierced in nasal, which is united below the naso-rostral; the both shields are separated above by the anterior end of the supranasal which is very narrow and cresentric in shape; scales on the top of head are small, imbricate, strongly keeled, 2 or 3 on a line across the tip of the snout, 6-9 scales between the supraoculars, which are very narrow; 2 scales are present between the nasal and the eye; 10-15 small scales are present around the eye; temporal scales are small, the lowermost row is largest and smooth, the upper rows are strongly keeled; supralabials are 10-12, fourth and fifth are largest, 3-4 rows of small scales are present between them and the eye; posterior genials are small, smaller or much smaller than the anterior genials, separated by small scales; scales in 25 to 29 : 27 : 33 : 21 to 23 rows, which are quite smooth; ventral shields in males and females are from 153-180; sub caudal shields in males and females are 41-64 and are paired; hemipenis extends up to 10th caudal plate; forked opposite the 2nd and 3rd caudal plate, calculate in distal half, bearing spine' in the proximal portion, the largest spines are present near and around the fork.

Dorsal coloration is lighten to sandy, with a vertebral series of 23-29 large, oval, chestnut spots, with black or dark brown margins narrowly edged with cream color, these sport generally fuse in most of the individuals; on lateral aspects also a series of similar spots are present, but these are comparatively smaller than the vertebral spots; under side of head is with two large dark spots; a light V shaped mark with its apex on top of snout; labials and lateral aspects of snout spotted with brown and cream color; ventrum is whitish with a pink tinge and is with black semilunar spots; chin and throat are whitish, but in many individuals the scales of this area are tipped with black.

Distribution: India: Gujarat: Surat, Vadodara, Gandhinagar, Dangs and Bharuch districts. Whole of India. Elsewhere: Sri Lanka, Pakistan, Eastern Himalayas, Burma, Thailand and many parts of Indo-Chinese region.

Habits and habitat: Inhabits the plains, foothills and uplands up to 2500 meters, grasslands, cultivated fields, bushes near the marshy areas; these are generally nocturnal, sluggish, ill tempered. Food comprises small rodents and frogs. Young ones are born in June, the number generally remains between 20. 25 in a single liter and they measure between 250-300 mm.

Status: Though the snake is available everywhere in its range, but nowhere common, the species is abundant in some areas, rare or missing in others.

Atretium schistosum (Daudin 1803)

Olive-Keel back

The length of the snake never exceeds 650 mm (tail is 10 mm.). Besides the characters already mentioned under the genus, the loreal in most species is generally united with the prefrontal shields; preocular is one; postoculars are two; anterior temporal one; supralabials 6 or 7, the 2nd and 3rd or the 4th touching the eye; dorsal body scales are in 17 rows; ventral shields are 164-202, angulate laterally; subcaudals are 40-59; anal shield is divided; hemipenis extends to the 8th caudal plate, not forked, it is covered with spines all over but the spines are comparatively smaller at the tip and these are more compact in this area; size of the spines increase gradually towards the base of the hemipenis. Dorsal coloration is reddish-brown or purple, with distinct cross-bars or transversely arranged spots; ventrum is whitish, uniform or with faint lateral spots; head with 3 chevron shaped marks.

Distribution: Gujarat (Vadodara, Bharuch, Gandhinagar, Bhavnagar and Dangs districts); Peninsular India, Western Himalayas, Bengal. Elsewhere: Sri Lanka, Pakistan, (Baluchistan, Sind, North West Frontier Provinces); Nepal.

Habits and habitat: It is most agile, diurnal snake, inhabiting the masonry work of old buildings and rocky areas around them; it is quite common in plains also. It is very shy and in the habit' of concealing, when alarmed. Its food comprises insects, grubs, spiders, small reptiles and their eggs, amphibians, birds and their eggs, small rodents (mice); it is oviparous. Status: Available in sufficient numbers throughout its range. ■

Oligodon arnensis (Shaw 1802)

Banded Kukri

The length of the snake never exceeds 650 mm (tail is 10 mm.). Besides the characters already mentioned under the genus, the loreal in most species is generally united with the prefrontal shields; preocular is one; postoculars are two; anterior temporal one; supralabials 6 or 7, the 2nd and 3rd or the 4th touching the eye; dorsal body scales are in 17 rows; ventral shields are 164-202, angulate laterally; subcaudals are 40-59; anal shield is divided; hemipenis extends to the 8th caudal plate, not forked, it is covered with spines all over but the spines are comparatively smaller at the tip and these are more compact in this area; size of the spines increase gradually towards the base of the hemipenis. Dorsal coloration is reddish-brown or purple, with distinct crossbars or transversely arranged spots; ventrum is whitish, uniform or with faint lateral spots; head with 3 chevron shaped marks.

Distribution: Gujarat (Vadodara, Bharuch, Gandhinagar, Bhavnagar and Dangs districts); Peninsular India, Western Himalayas, Bengal. Elsewhere: Sri Lanka, Pakistan, (Baluchistan, Sind, North West Frontier Provinces); Nepal. Habits and habitat: It is most agile, diurnal snake, inhabiting the masonry work of old buildings and rocky areas around them; it is quite common in plains also. It is very shy and in the habit' of concealing, when alarmed. Its food comprises insects, grubs, spiders, small reptiles and their eggs, amphibians, birds and their eggs, small rodents (mice); it is oviparous. Status: Available in sufficient numbers throughout its range. ■

Atretium schistosum (Daudin 1803)

Indian Rat Snake

Body is slender, cylindrical, tapering with a long head which is quite distinct from the neck; total body length reaches up to 2800 mm in males and 2300 mm in females; snout obtusely pointed; width of rostral shield is less than its height; nostril is situated between the nasals and first supralabial; loreals are 2, 3 or 4; preoculars are two, upper one is almost four times larger than the lower; postoculars are two or three; 2 anterior temporals; 2 posterior temporals; supralabials are 8, fourth and fifth touching the eye; infralabials are 9 or 10; two anterior and two posterior chin shields are present, posterior are in contact anteriorly, comparatively longer than the anterior chin shields; body scales in' 10 or 20 or 21 (at neck) : 16 or 17 (at middle of body) : 14 or 15 at tail just anterior to vent; all scales with a pair of apical pits; scales on the an terior portion of body are smooth; posterodorsal scales of the body are feebly keeled; ventral shields are 190-213; subcaudal shields 100-146; anal shields are two; hemipenis extends to the 10th, 11th or 12th caudal plate, not forked, distal one-third is flounced, the fold at the tip are much tinar than which are available downwards, this part is followed by the area where the flounces are with much thicken walls and joined together in part to form calyces; this thicker walled area is followed abruptly by aspine-bearing zone, the spines are thick and fleshy and terminate into a spicule; the hemipenal spines are 11 or 12 in a lateral series; at the base of the hemipenis there are two very large spines; the distal one half or ene-third of the(organ is incompletely divided into two parts by the invaginations of the external wall of the organ (the intimate connection between both the parts is effected by a connective tissue) are firmly united with the sulcus. Dorsal coloration is olive green, brown, yellowish, grey, dull tan, dark olive brown, many posterior scales are with black tips and edges, other anterior scales are with yellow or light tan edges; labials and in many individual other lateral head shields are markedly edged with black; top of the head is devoid of the spots; ventrum is creemish or turbid white, free edges of the ventrals and subcaudals are blackish. In juveniles these markings are more conspicuous.

Distribution: India: Gujarat: Rajkot, Jamnagar, Vadodara, Gandhinagar, Bhavnagar, Bharuch, Panchmahals, Sabarkantha, Dangs and Kachchha districts. Whole of India and Andanlan islands. Elsewhere :South China; Vietnam, Iran; Southern Afghanistan to Transcaspia; Sri Lanka; Java; Sumatra; Malaysia; Taiwan and Pakistan.

Habits and habitat : This is most active, diurnal snake, is available in varied habitats like plains, agricultural fields, grasslands, trees and hollows in them under dead wooden logs, under stones, crevices in rocks, old inhabited houses. Its food comprises small mammals, birds, reptiles, eggs of the birds and amphibians. The breeding season starts in April which extends up to September. Status: It is a common snake throughout its range but is subject to the commercial exploitation on account of its large scale killing for skin. ■

Amphiesma stolata (Linnaeus 1758)

Striped Keel Back

The striped keel back reaches to a length of about 350 mm and bears the following characters: Maxillary teeth 21-24, last two are enlarged; supralabials 7 or 8, 3rd to 5th or 3rd and 4th touching the eye; loreal 1; one pre and 3 postocular are available temporals are generally 1+2, in certain individuals are 1+1; scales round the body are in 19 rows, which are keeled except the outer most row, which is smooth; in certain individuals only 17 rows of scales are available at mid-body; ventral shields are from 118-158; subcaudal shields are from 50-89; anal shield is divided; hemipenis extends up to the 8th caudal plate, forked at anterior tip, spines are present on the complete organ except at the basal part. Dorsal coloration is olivacious or olive-brown or somewhat greenish; with a pair of pale yellow stripes, which sometimes break up into spots in the anterior region of the body; the space between these stripes is with dark-brown to black spots, which are extremely distinct in the anterior region; dorsal aspect of head is with a tinge or bluish gray color on olive background, frontal and parietal region is with a black border; there is a black V-shaped mark on the neck; black streaks are present, in front and underside of the eye and from postocular to angle of mouth; ventrum is whitish, somewhat creamy, in most scales small black spots are present at the tips of the ventral shields. ■

Hemidactylus triedrus (Daudin, 1802)

Termite Hill Gecko

Distribution: India Gujarat (Gandhinagar, Vadodara, Panchmahals, Dangs and Bhavnagar district). Whole of India including the Andaman Islands. Elsewhere: Sri Lanka, Pakistan, Southern China, Hainan and Vietnam.

Habits and habitat: This diurnal terrestrial snake is available in; moist grassy areas, under stones, under wooden logs, grassy plots, under the falleri leafs of trees and in gardens. It is a gentle snake and never makes an attempt to bite even on mishandling. Its food comprises frogs, toads, small mammals and lizards. It has been reported for laying eggs in May, generally it lays about 10 eggs in a single clutch, and the incubation period is about 20 days.

Status: Most common throughout its range.

Diagnosis: A medium sized fairly stout gecko, adults ranging 58–76 mm in SVL. Dorsum in a shade of light brown with paired, thin black edged white bands at regular intervals. Dorsal scalation on trunk, granular, intermixed with enlarged, keeled 19–20 trihedral tubercle rows arranged in fairly regular longitudinal series. Seven lamellae under digit I of pes and manus, eight to nine under digit four of manus and pes. An angular series of seven to nine precloacal femoral pores separated at mid-pelvic by a diastema of one to three non-pored scales. Distribution: Sri Lanka, India (Andhra Pradesh, Karnataka, Tamil Nadu, Kerala). ■

Calotes versicolor versicolor (Daudin, 1802)

Garden Lizard

It is an insectivore and the male gets a bright red throat in the breeding season. It measures over 10 cm (3.9 in) in length snout-to-vent. Total length including the tail is up to 37 cm (14.5 in). Two small groups of spines, perfectly separated from each other, above each tympanum. Dorsal crest moderately elevated on the neck and anterior part of the trunk, extending on to the root of the tail in large individuals, and gradually disappearing on the middle of the trunk in younger ones. No fold in front of the shoulder, but the scales behind the lower jaw are much smaller than the others; gular sac not developed. From thirty-nine to forty-three series of scales round the middle of the trunk. The hind foot (measured from the heel to the extremity of the fourth toe) is not much longer than the head in the adult, whilst it is considerably longer in the young.

The coloration is very variable, sometimes uniform brownish or greyish-olive or yellowish. Generally broad brown bands across the back, interrupted by a yellowish lateral band.

Black streaks radiate from the eye, and some of them are continued over the throat, running obliquely backwards, belly frequently with greyish longitudinal stripes, one along the median line being the most distinct; young and half-grown specimens have a dark, black-edged band across the inter-orbital region. Changeable Lizards eat mainly insects such as crickets, grasshoppers, ants and small vertebrates, including rodents and other lizards. Although they have teeth, these are designed for gripping prey and not tearing it up. So prey is swallowed whole, after it is stunned by shaking it about. Sometimes, young inexperienced Changeable Lizards may choke on prey which are too large. Occasionally changeable lizards also consume vegetable matter. ■

Lissemys punctata (Bonnaterre, 1789)

Indian Flap-shelled Turtle

Distribution: Pakistan, India (Tamil Nadu, Kerala, Sikkim, Gujarat, Maharashtra, Himachal Pradesh, Madhya Pradesh, Assam), Sri Lanka, Nepal, Bangladesh (Indus and Ganges drainages), Burma (Irrawaddy and Salween rivers)

Reproduction: oviparous.

Habitat: freshwater (rivers and tributaries, lakes). ■

Varanus bengalensis (Daudin, 1802)

Indian Monitor

Distribution: SE Iran, Afghanistan, Pakistan, N India (Assam, Himachal Pradesh, Madhya Pradesh, Tamil Nadu, Gujarat, Mizoram , Maharashtra, Kerala, etc.), Bhutan, Nepal, Sri Lanka, Bangladesh, Myanmar (= Burma), Thailand (incl. Phuket), N Vietnam, Laos, Cambodia, W Malaysia, Pulau Tioman, Indonesia (Java), China (Yunnan).

Physical Description: Adult Bengal monitors are generally grey or greenish-grey in color, with a ventral pattern of grey to black cross-bars from the chin to the tail. These markings are generally darkest in the western parts and lightest in the eastern parts of the geographic range. These ventral markings typically become lighter, and the ground color darker, with age. Thus, adults display a less pronounced, less contrasting pattern than younger Bengal monitors. In the wild, the heaviest recorded male Bengal monitor weighed 7.18 kg, though captive individuals have been reported to reach 10.2 kg. In the wild, males generally weigh 42% more than females. Males of the same snout to vent length (SVL) as females are typically 9.2% heavier. Young Bengal monitors, on average, weigh 0.078 kg. (Auffenberg, 1994). ■

ARACHNIDS

Arachnids are essentially terrestrial animals distributed almost across every part of the world. They represent a highly recognizable and populous eight-legged invertebrates. The class arachnida includes orders Araneae (spiders), Scorpionidae (scorpions), Pseudoscorpionidae (Pseudoscorpion), Solufigidae (Solu-figids), Opilionida (Marvestmee), Pedipalpida (Whip scorpions) and acarina (ticks, mites etc.,). Spiders play a paramount role in maintaining biological balance in an ecosystem. They are potential predators of nearly all kinds of insects. Scorpions represent one of the most primitive nocturnal animals distributed throughout the tropical and subtropical world.

Woodlands, grasslands and wetlands spread across the CUTN campus highlight the importance of habitat heterogeneity for animal species. The presence of leaf litter, branches and rotting logs in woodlands attract a wide range of arachnid species within the campus, and importantly, spider species are more associated with deep leaf litter layers. The CUTN campus enriched with a wide variety of plants, decaying branches of trees, foliage both within the academic as well as residential complexes attracts a plethora of arachnid species. The aim of this chapter is to document the diversity of arachnids within the CUTN campus. We have documented around 7 species of arachnids within the CUTN campus over a period of one year. ■

Chapter-5

Hottentotta tamulus (Fabricius, 1798)

Indian Red scorpion

Hottentotta tamulus (H.tamulus) ranges in size from 50–90 mm. The coloration ranges from dark orange or brightly red-brown through dull brown with darker grey carinae (ridges) and granulation. Grey spots might be distributed irregularly across the cephalothorax and the mesosoma. The walking legs and the tip of the pedipalp pincers are brighter colored (orange-yellow to light reddish-brown). The mesosomal tergites always bear three distinct carinae. Their habitus is typical of buthid scorpions, with rather small pedipalp pincers, moderately thickened metasomal segments and a rather bulbous telson with large stinger. The base of the pedipalp pincers (manus) is slightly more inflated in males than in females.

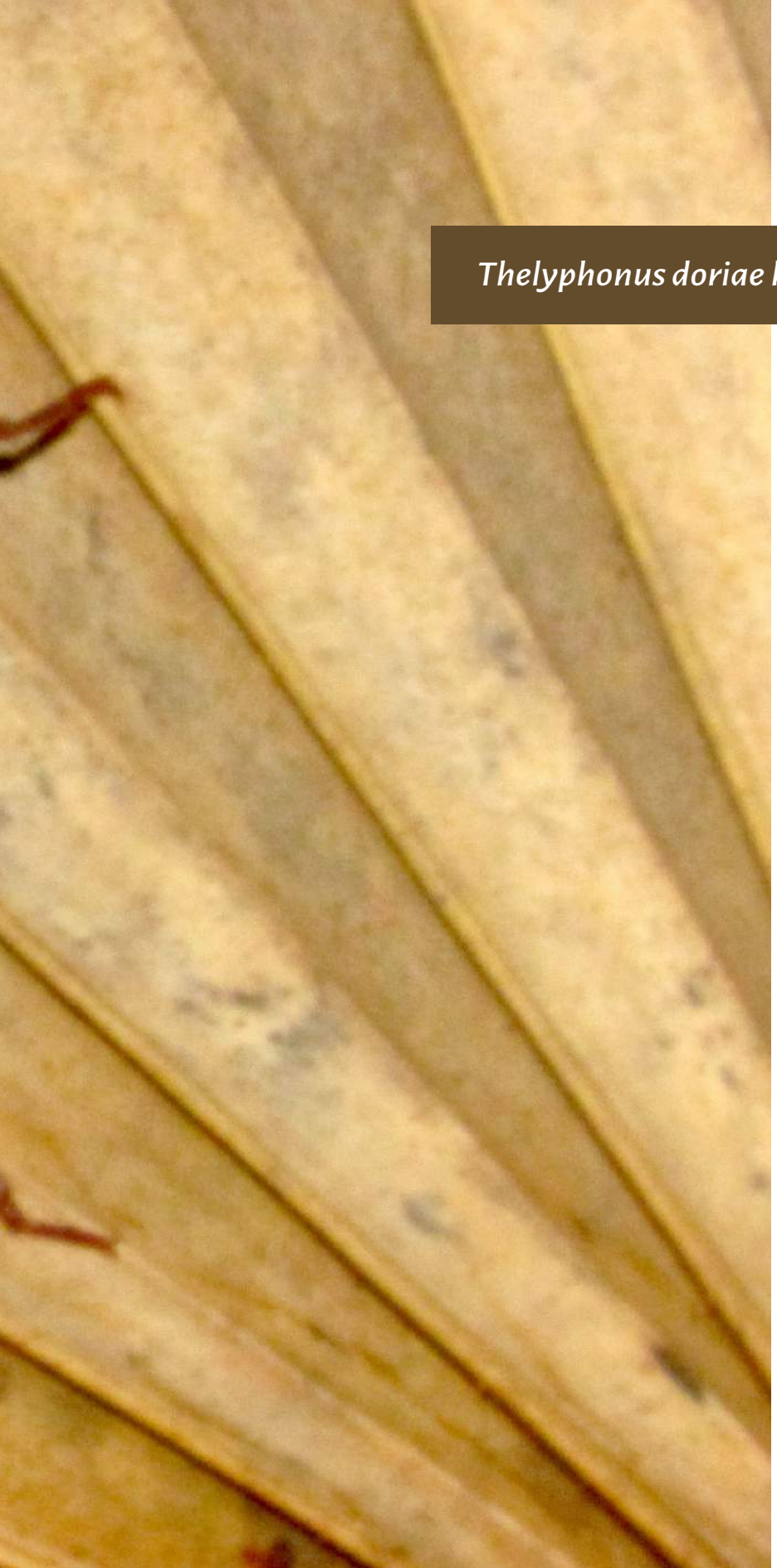
The Indian red scorpion is the most deadly species of scorpions in the world. These nocturnal predators are native to India and are rarely found outside of Eastern Nepal, Eastern Pakistan and Sri Lanka. Indian red scorpions lie in wait for their prey, grab the passing victim with their pincers and then sting with their tail before feasting on their dying meal. The venom liquefies the prey's insides, which can then be digested by the scorpion. The remaining body parts are cast aside. Insects and other small invertebrates are the typical food source for these scorpions. Some small vertebrates, such as lizards, can also become prey. Humans and larger animals are not the common targets of this species of scorpion, and only stings as a last resort, a self-defense strategy.

These scorpions pose a particularly high threat in their native lands, due to their tendency to live around humans. Since immediate health care might not always be available in remote Indian villages, death isn't uncommon after a sting. The deadly neurotoxin rTamapin works quickly to block potassium channels in the body, causing rhythmic fluctuations in blood pressure and cardiovascular collapse. Left untreated, an Indian red scorpion sting can lead to pulmonary edema, causing death in <72 hours. Children are especially susceptible to these stings, many a times getting stung while running around outside barefoot. Indoors, stings typically occur during the early morning or night time, as scorpions accidentally crawl into beds or fall from ceilings. ■

Pandinus imperator (Koch, 1842)

Emperor Scorpion

The emperor scorpion Pandinus imperator (P.imperator) is one of the largest species of scorpion in the world, with adults averaging about 20 centimetres (7.9 in) in length and a weight of 30 g. However, some species of forest scorpions are fairly similar to the emperor scorpion in size, and one scorpion, Heterometrus swammerdami, holds the record for being the world's largest scorpion at 9 inches (23 cm) in length. The large pincers are blackish-red and have a granular texture. The front part of the body, or prosoma, is made up of four sections, each with a pair of legs. Behind the fourth pair of legs are comb-like structures known as pectines, which tend to be longer in males than in females. The tail, known as the metasoma, is long and curves back over the body. It ends in the large receptacle containing the venom glands and is tipped with a sharp, curved stinger. Scorpion stings can be categorized as mild (similar to a bee sting) to severe to humans depending on the species. Most people are not affected by the emperor scorpion's sting, though some people may be allergic to scorpion stings in general. Sensory hairs cover the pincers and tail, enabling the emperor scorpion to detect prey through vibrations in the air and ground. When gravid (pregnant), the body of a female expands to expose the whitish membranes connecting the segments. The emperor scorpion fluoresces greenish-blue under ultra-violet light. They are known for their docile behavior and almost harmless sting; they do not use their sting to defend themselves when they are adults, however, they may use it in their adolescent stages. They prefer to use their pincers to crush and dismember their prey, their exoskeleton is very sclerotic, causing them to have a metallic greenish black colour. ■



Thelyphonus doriae hosei (Pocock, 1894)

Whip Scorpions

The whip scorpion (Thelyphonus doriae hosei) ranges from 25 to 85 mm (1.0 to 3.3 in) in length, with most species having a body no longer than 30 mm (1.2 in); the largest species, of the genus Mastigoproctus, reaching 85 mm (3.3 in). Because of their legs, claws, and "whip", they appear much larger, and the heaviest specimen documented till date weighed ~12.4 grams (0.44 oz). Like the related orders Schizomida and Amblypygi, the vinegaroons use only six legs for walking, with the first two legs serving as antennae-like sensory organs. All species also have very large scorpion-like pedipalps (pincers) but there is an additional large spine on each palpal tibia. They have one pair of eyes at the front of the cephalothorax and three on each side of the head, a pattern also found in scorpions. Vinegaroons have no venom glands, but have glands near the rear of their abdomen that can spray a combination of acetic acid and caprylic acid when they are bothered. The acetic acid gives this spray a vinegar-like smell, giving rise to the common name vinegaroon. ■

ODONATES

Dragonflies and damselflies collectively called Odonates, are one of the most common insects flying over forest, fields, meadows, ponds and rivers. About 6,000 extant species are distributed all over the world. India is highly diverse with more than 500 known species. Odonata are one of the ancient orders of insects. It first appeared during the Carboniferous era, about 250 million years ago along with mayflies (Ephemeroptera). Dragonflies and mayflies are ancient groups of insects, which amongst others, were the first to develop wings and venture into air.

Dragonflies mastered the art of flying and continue to be the master's aerobats. Based on morphology, the order Odonata are divided into three groups, viz. damselflies (Zygoptera), Anisozygoptera and dragonflies (Anisoptera). Dragonflies and damselflies can easily be distinguished in the field. Although they differ considerably in morphology, their general life histories are comparable.

The CUTN campus have varied microhabitats, which includes small ponds and fresh ecosystem attracted many kinds of dragonflies and damselflies. This is only a preliminary report on Odonates. The campus predicted to be more Odonates present, this could be achieved a season wise systematic survey.■

Chapter-6

Pantala flavescens (Fabricius, 1798) (female)

Globe Skimmer

Diagnosis: Discoidal cell in fore-wing very narrow its costal side only about one-fourth to one- third the length of basal; membrane moderately large and white; in male, eyes reddish brown above, lilaceous or bluish laterally; wings hyaline, with base of hind-wing pale golden yellow as far distal as anal loop and with a narrow apical brown spot limited to the posterior border of wings; in female, eyes olivaceous brown above; wings often ,evenly and more or less deeply en fumed and always without the apical brown spot.

Size: Male-abdomen, 29 to 35 mm; hind wing, 38 to 40 mm. Female- abdomen, 30 to 33 mm; hind wing, 39 to 41 mm.

Habits and Habitat: A very common dragonfly of the plains and submontane region, showing migratory habits Large Migratory swarms can be observed during October and November. Breeding: Breeding takes place in weedy, marshy and shallow water.

Distribution: Cosmopolitan species. ■

Orthetrum chrysis (Selys, 1891)

Spine-tufted Skimmer

Diagnosis: Males bright red; frons bright scarlet-red; eyes red during life.; thorax dark ferruginous, and the abdomen bright blood-red; wings hyaline, with a dark golden-amber colored spot at base of hind wing extending to the first antenodal nervure; lamina of male genitalia with a tuft of stiff black bristles; in female, the red replaced by bright ochreous throughout; wings without any vestige of yellow basal marking.

Size: Male - abdomen, 28 to 33 mm; hind wing, 31 to 38 mm. Female - abdomen, 25 to 30 mm; hind wing, 31 to 36 mm.

Habits and Habitat : Usually found around gardens and brooks infested with macrophytes. Breeding; Breeds in pools and marshes near small brooks and submontane streams.

Distribution: Himachal Pradesh, Orissa, south Andaman Islands and Western, Ghats. ■

Orthetrum serapia (Watson, 1984)

Green Skimmer

Description: Orthetrum serapia is a medium-sized dragonfly with a wingspan of 60-85mm. Its wings are clear except for a small dark spot at the base of the hindwing. The thorax is greenish to greyish yellow with black markings. The abdomen is black with pale yellow or pale green markings. Orthetrum serapia appears very similar to Orthetrum sabina and can be confused where the range of the two overlap in north-eastern Australia. ■

Libellula vibrans

Great Blue Skimmer

The great blue skimmer (Libellula vibrans) is a dragonfly of the skimmer family. With a total length of 50 to 63 mm, it is one of the largest skimmers. The immature forms of the skimmer are brown in color and mature forms are blue-hued. This species is found near lakes, ponds, and slow streams in the eastern United States and rarely in southern Ontario.

Pantala flavescens (Fabricus)

Wandering Glider

Diagnosis: Discoidal cell in fore-wing very narrow its costal side only about one-fourth to one-third the length of basal; membrane moderately large and white; in male, eyes reddish brown above, lilaceous or bluish laterally; wings hyaline, with base of hind-wing pale golden yellow as far distal as anal loop and with a narrow apical brown spot limited to the posterior border of wing; in female, eyes olivaceous brown above; wings often ,evenly and more or less deeply en fumed and always without the apical brown spot. Size : Male - abdomen, 29 to 35 mm; hind wing, 38 to 40 mm. Female- abdomen, 30 to 33 mm; hind wing, 39 to 41 mm.

Habits and Habitat : A very common drag-onfly of the plains ,and submontane regions, showing migratory habits large migratory swarms can be observed during October and November. Breeding: Breeding takes place in weedy, marshy and shallow water.

Distribution: Cosmopolitan species. ■

Orthetrum luzonicum (Brauer)

Marsh Skimmer

Diqgnosis: Face and frons pale bluish or greenish yellow; eyes bluish green capped violet; in sub adult male, thorax pale olivaceous green dorsally with some clouding of brownish along mid dorsal carina, a broad reddish brown humeral s tripe bordered in front with black; abdomen pruinosed blue; in very old adults, thorax and abdomen pruinosed pale azure blue except at sides of segments 1, 2 and base of 3 bright yellow; wings hyaline, Cuii in hind wing arising from the distal ‚s' de of discoidal cell well away from its post‚erior angle; female similar to the sub adult male in color and markings but usually paler and the dark markings les s extensive.

Size: Male - abdomen, 28 to 30 mm; hind wing, 30 to 32 mm. Female - abdomen, 28 to 32 mm; hind wing 30 to 32 mm. Habits and Habitat: Found in the montane and submontane areas.

Breeding: Breeds to marshy and swampy areas.

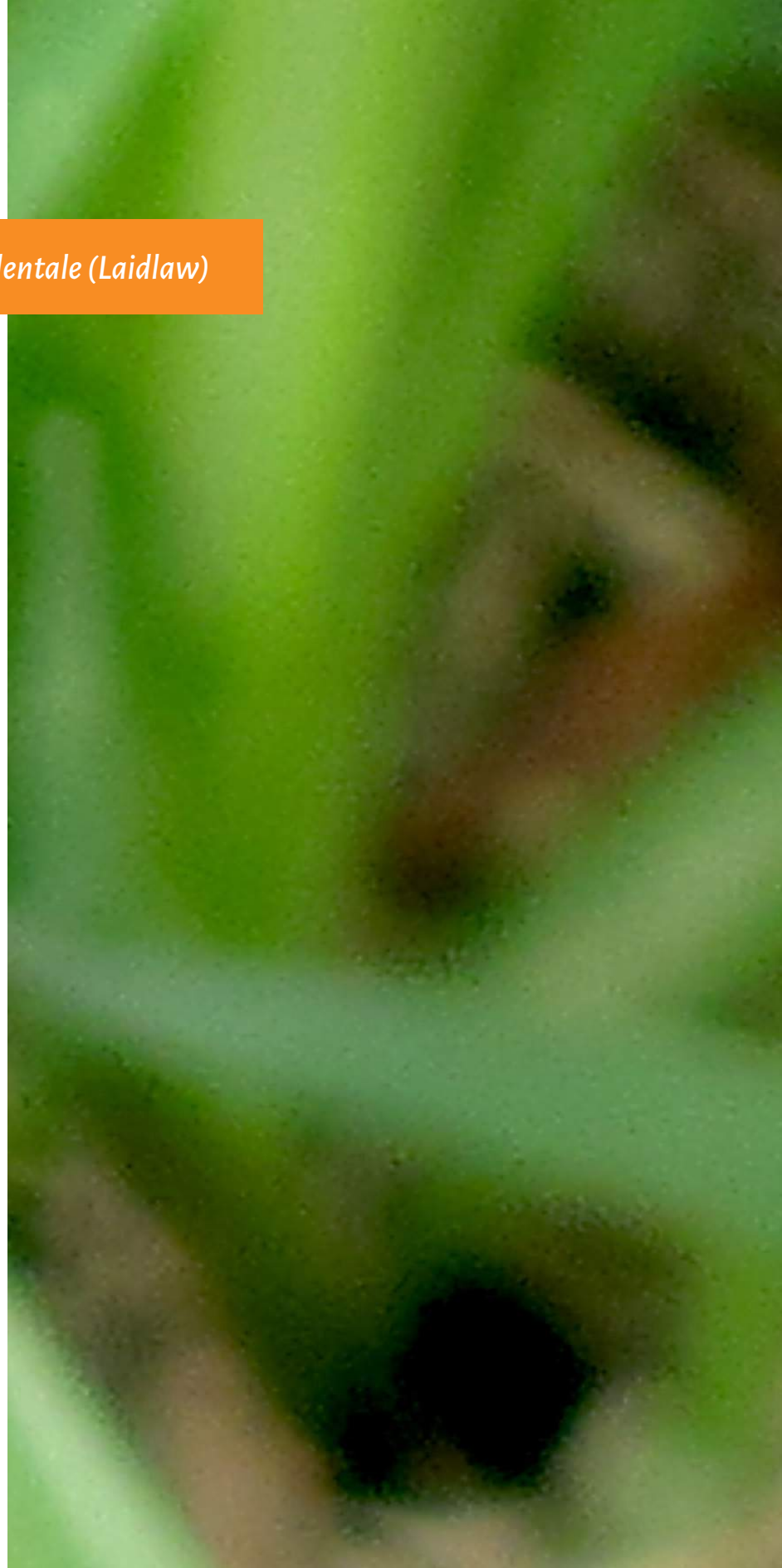
Distribution; Extends throughout India.

Aciagrion occidentale (Laidlaw)

Green-striped Slender Dartlet

Diagnosis: no ridges on frons; post ocular colored spots always present; pterostigma in fore wing larger than that in the hind wing; abdomen usually very long and slender; female with an apical ventral spine on segment .8; ground color blue with black markings on head, thorax and abdomen; eyes botde green above, with a small black cap, palest blue beneath, changing through pale greenish yellow to the darker shade above; males very small and very slender; abdominal segment 8 with a black elongate dorsal triangular mark, its ha eat apex of the segment and the apex of the mark nearly reaching base of the segment; female somewhat similar to the male, but much more robust and with a stouter abdomen; markings entirely similar to those of males; abdominal segment 8 with the dorsal marking much broader and of almost 'Yen width throughout. Size: Male - abdomen, 23 to 24 mm' hind wing, 15 to 16rnm, Female - abdomen, 24 mm; hind wing, 16 rom.

Habit and Habitat: A migratory species; widely distributed in montane and sub montane areas in, open grass besides weedy ponds and herbage. Breeding; common during post monsoon, mixing with Agriomemis pygolae and Pseudagrion microcephalum. Breeds in weedy waters. Distribution; Throughout South India, central India and Sri Lanka. ■



Orthetrum albistylum

Common Skimmer

This species occurs from central and south Europe to China and Japan. Its distribution is often patchy but in many areas it is common. The species has recently spread its range northwards to the Baltic Sea coast in Poland. The common name for this species is white-tailed skimmer. One of the ongoing threats affecting the habitat of Orthetrum albistylum is the production of crops. The water pollution associated with crop production is also having a direct effect on the quality of the habitat of this species. ■

Rhyothemis variegata (Linnaeus, 1763)

Common Picture Wing

Diagnosis: Body very dark metallic; frons metallic above; eyes dark reddish brown above; wings widely different in the sexes; wings marked with black and amber-yellow; male with whole of wings tinted yellow fore wings with spots at node, discoidal cell, apex ,and at middle of Riii; hind wings with similar dark Spots and two broad longitudinal basal bands,; female with broader, shorter wings; fore wings hyaline from node to apex, basal half with broad black markings, hind wings with broad irregular markings to as far distal as preterostigma, apex hyaline. Size: Male - abdomen, 23 to 25 mm; hind wing, 33 to 36 mm. Female - abdomen, 20 to 22 rom; hind wing, 28 to 37 mm.

Habits and Habitat: A local insect of the plains, found around weedy tanks; weak in flight. Breeding: Breeds in large numbers during September and April. Distribution: Throughout India. ■

Orthetrum sabina (Drury, 1770)

Green Marsh Hawk

Diagnosis: Eyes more or less broadly confluent on vertex and greenish in color during life; never less than 12 antenodal nervures in fore wing; both sexes colored black with yellow markings; abdomen ,enormously swollen at base and then abruptly slimmed and compressed laterally to the end; black marked with greenish yellow.

Size; pale - abdomen, 30 to 36 mm; hind wing 30 to 36 mm. Female abdomen, 32 to 35 mm; hind wing, 31 to 35 rom.

Habits and Habitat; This is the most predaceous dragonfly found in India; usually found near ponds and streams, during the cold weather they undergo hibernation,. Breeding: Breeding occurs in still water, marshy side pools of slow running streams, perennial and seasonal monsoon ponds.

Distribution: Widely distributed throughout India. ■

Miscellaneous

Animals

Chapter- 7

Funambulus palmarum (Linnaeus, 1766)

Common Palm Squirrel

This species is listed as Least Concern because of its wide distribution which is expanding, presumed large population, occurrence in a number of protected areas, tolerance to some degree of habitat modification, and because the population is likely to be increasing. This species is endemic to southern India and Sri Lanka. It is widely distributed found at elevations from sea level up to 2,000 m asl. This is a very adaptable species. It is a diurnal and semi-arboreal. This species occurs in tropical and subtropical dry deciduous forest, mangrove forest, grasslands, scrublands, plantations, rural gardens and urban areas. In Sri Lanka, found throughout the island except in deep jungles. ■

Canis lupus familiaris (Linnaeus, 1758)

Dog

Size and weight: Dogs are highly variable in height and weight. The smallest known adult dog was a Yorkshire terrier that stood only 6.3 cm (2.5 in) at the shoulder, 9.5 cm (3.7 in) in length along the head-and-body, and weighed only 113 grams (4.0 oz). The largest known dog was an English Mastiff which weighed 155.6 kg (343 lb) and was 250 cm (98 in) from the snout to the tail. The tallest dog is a Great Dane that stands 106.7 cm (42.0 in) at the shoulder. Senses; The dog's senses include vision, hearing, sense of smell, sense of taste, touch and sensitivity to the earth's magnetic field. Another study suggested that dogs can see the earth's magnetic field. Coat; The coats of domestic dogs are of two varieties: "double" being common with dogs (as well as wolves) originating from colder climates, made up of a coarse guard hair and a soft down hair, or "single", with the topcoat only. Breeds may have an occasional "blaze", stripe, or "star" of white fur on their chest or underside.

Regarding coat appearance or health, the coat can be maintained or affected by multiple nutrients present in the diet, see Coat (dog) for more information. Tail; there are many different shapes for dog tails: straight, straight up, sickle, curled, or cork-screw. As with many canids, one of the primary functions of a dog's tail is to communicate their emotional state, which can be important in getting along with others. In some hunting dogs, however, the tail is traditionally docked to avoid injuries. In some breeds, such as the Braque du Bourbonnais, puppies can be born with a short tail or no tail at all. ■

Ovis aries (Linnaeus, 1758)

Macheri Sheep

Mecheri sheep are distributed in Salem, Namakkal, Erode, Karur and parts of Dindigul and Dharmapuri districts of Tamil Nadu. The name Mecheri has been derived from its place of origin i.e., Mecheri block in Mettur taluk of Salem District. The place Mecheri is said to be derived from “Mechal Eri” (Mechal - grazing of sheep and Eri-pond). The Mecheri sheep has other synonyms like Thuvaramchempuli, Maiylambadi and Kannivadi. Mecheri sheep with typical morphological features are seen in Tharamangalam, Omalur, Kolathur and Mecheri blocks of Salem district.

Mecheri sheep are medium sized animals with compact body and covered with short hairs, which are not shorn. They are light brown in colour. The profile is slightly Roman nose. Mecheri sheep is classified under polled breeds of sheep. Both males and females are polled. The legs are medium sized, straight and medium in length, squarely set under the body. The hooves are brown or black in colour. Udder is not well developed. It is small and round, tightly attached to the belly with small conical teats placed laterally. The teats are directed slightly outward.
The leather made from Mecheri sheep skins have higher tensile, tear and grain crack strengths as compared with leather made from mixed origin. With regard to organoleptic properties of skin, the Mecheri skin is better in quality in terms of softness, grain tightness, fullness, surface smoothness, and uniformity of colour and general appearance.

The hand evaluation assessment and strength characteristics determination reveals that the Mecheri sheep skins are superior and are suitable for higher quality garment or upper valued leathers. The special features of this breed are early sexual maturity, superi**or** skin quality and high dressing percentage. ■

Bubalus bubalis (Linnaeus, 1758)

Buffalo

The skin of river buffalo is black, but some specimens may have dark, slate-coloured skin. Swamp buffalo have a grey skin at birth, but become slate blue later. Albinoids are present in some populations. River buffalo have comparatively longer faces, smaller girths, and bigger limbs than swamp buffalo. Their dorsal ridges extend further back and taper off more gradually. Their horns grow downward and backward, then curve upward in a spiral. Swamp buffalo are heavy-bodied and stockily built; the body is short and the belly large. The forehead is flat, the eyes prominent, the face short, and the muzzle wide. The neck is comparatively long, and the withers and croup are prominent. A dorsal ridge extends backward and ends abruptly just before the end of the chest. Their horns grow outward, and curve in a semicircle, but always remain more or less on the plane of the forehead.

The tail is short, reaching only to the hocks. Height at withers is 129–133 cm (51–52 in) for males, and 120–127 cm (47–50 in) for females. They range in weight from 300–550 kg (660–1,210 lb), but weights of over 1,000 kg (2,200 lb) have also been observed. The rumen of the water buffalo has important differences from that of other ruminants. It contains a larger population of bacteria, particularly the cellulolytic bacteria, lower protozoa, and higher fungi zoospores. In addition, higher rumen ammonia nitrogen (NH4-N) and higher pH have been found as compared to those in cattle. ■

Macrochlamys indica (Bensen, 1832)

Land Snail

Ecology and Habitat
Land molluscs are mostly ground dwellers and can be found in habitat ranging from parks, gardens, bushes, and vegetation patches to natural forests. Unlike aquatic molluscs, which always remain surrounded by water, landforms are often restricted to habitats that offer sufficiently shady and moist situation for their survival. Thus the primary habitat for them are damp shady corners among vegetation, under fallen leaves, litters, under stones, wooden logs, and in crevices.

Shell and Anatomy
The shell is perforate, depressed, smooth, polished throughout, translucent, pale brownish tawny, not distinctly striated, but with microscopic longitudinal impressed lines, slightly flexuous and not close together. The spire is low, conoid. The suture is slightly impressed. The shell has 5.5 whorls that are slightly convex above. The last whorl is not descending. The last whorl is rounded at the periphery and moderately convex beneath. The animal is purplish grey not black, elongate. The right shell-lobe is small, the left is narrowly reflected over the edge of the peristome, and at the basal side gives off a short tongue-like process. The right dorsal lobe is narrow and elongate, the left in two distinct portions.

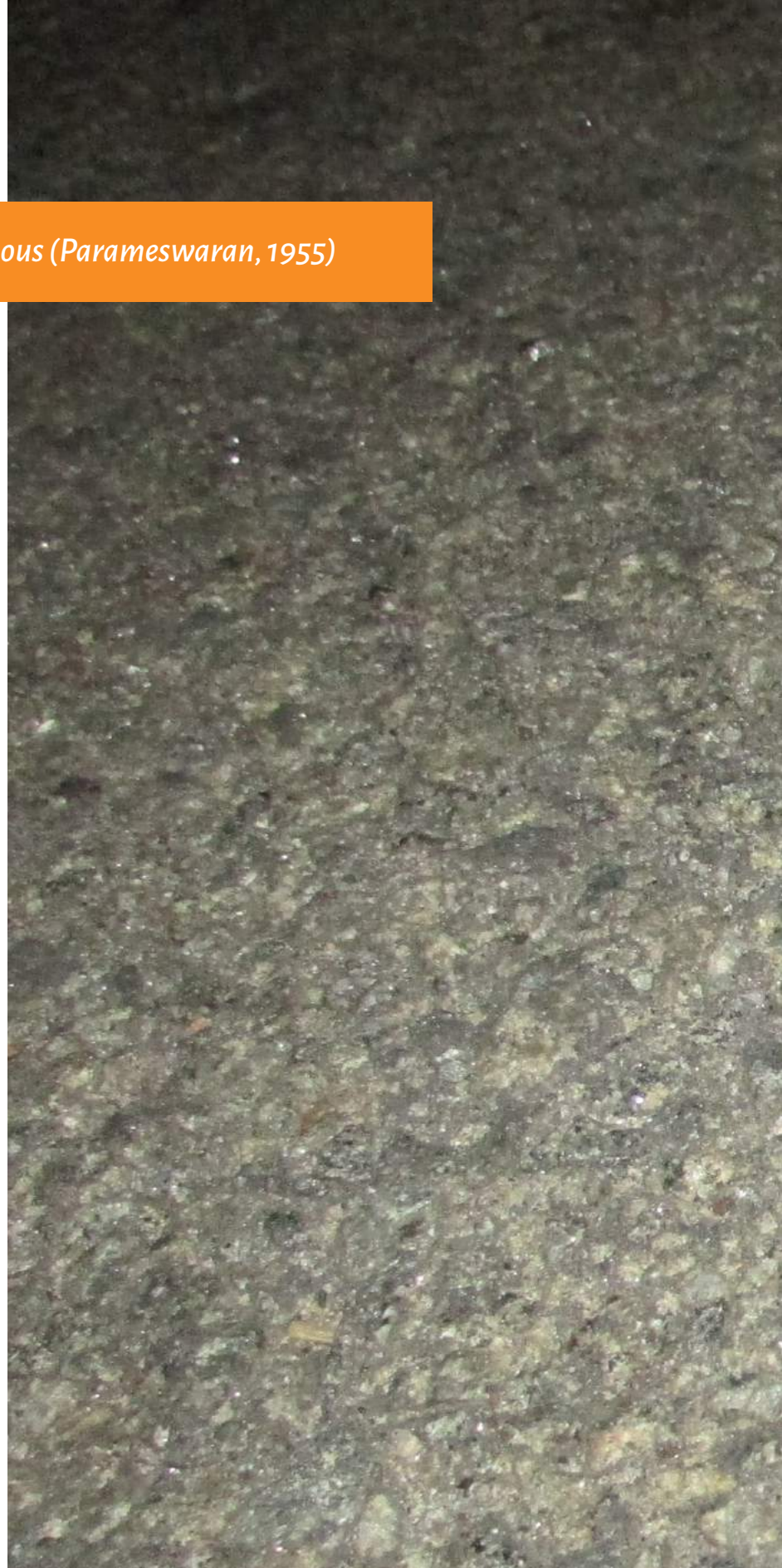
In the genitalia is a moderately long cylindrical blunt kalc-sac is given off at the junction of the vas deferens, and the caecum of the penis, to which the retractor muscle is attached, is sharply coiled. The dart-sac is long, the spermatheca short and elongately pearshaped. ■

Paratelphusa hydrodromous (Parameswaran, 1955)

Freshwater Crab

Freshwater crabs are found throughout the tropical and sub-tropical regions of the world. They live in a wide range of water bodies, from fast-flowing rivers to swamps, as well as in tree boles or caves. They are primarily nocturnal, emerging to feed at night; most are omnivores, although a small number are specialist predators, such as Platythelphusa armata from Lake Tanganyika, which feeds almost entirely on snails. Some species provide important food sources for various vertebrates. A number of freshwater crabs (for example species from the genus Nanhaipotamon) are secondary hosts of flukes in the genus Paragonimus, which causes paragonimiasis in humans.

The majority of species are narrow endemics, occurring in only a small geographical area. This is at least partly attributable to their poor dispersal abilities and low fecundity, and to habitat fragmentation caused by the world's human population. In West Africa, species that live in savannahs have wider ranges than species from the rainforest; in East Africa, species from the mountains have restricted distributions, while lowland species are more widespread. Every species of freshwater crab described so far has been assessed by the International Union for Conservation of Nature (IUCN) of the species for which data are available, 32% are threatened with extinction. For instance, all but one of Sri Lanka's 50 freshwater crab species are endemic to that country, and more than half are critically endangered. ■



Scolopendra cingulate (Latreille, 1829)

Banded Centipede

The species has alternating bands of black and yellow-gold. At approximately 10–15 centimetres (3.9–5.9 in), Scolopendra cingulata is one of the smallest species in the family Scolopendridae. Its venom is also not as toxic as that of other scolopendrid centipedes. Scolopendra cingulata is a burrowing animal, preferring dark, damp environments such as beneath logs and in leaf litter. Scolopendra cingulata is an opportunistic carnivore. It will attack and consume almost any animal that is not larger than itself. These include insects and small lizards. ■

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