SARTH PETHIYAGODA

Rohan Pethiyagoda has during the past two decades worked extensively on biodiversity exploration in Sri Lanka, in the course of which he has discovered and described dozens of new species of amphibians, lizards and freshwater fishes. He is, in addition, author of several books, including *Freshwater fishes of Sri Lanka*, and scholarly biographies of important naturalists including Harmanis de Alwis, E. F. Kelaart and J. W. Bennett. As managing trustee of WHT, the Wildlife Heritage Trust of Sri Lanka (1990–2005), he also caused biographies of G.M.R. Henry and W.W.A. Phillips, among others, to be published.

Rohan was educated at King's College (University of London) and Sussex University, prior to which he schooled at St Thomas' College, Mt Lavinia, Sri Lanka. He is a Fellow of the National Academy of Sciences and has held several senior government appointments, including Director of Biomedical Engineering (Ministry of Health), Chairman of the Water Resources Board, and Adviser to the Ministry of Environment. Until 2006 he also served on several international committees, including various IUCN specialist groups, the World Commission on Protected Areas, and the Species Survival Commission.

In 1990 Rohan established WHT, a private foundation, to support biodiversity exploration and research in Sri Lanka. WHT-supported projects have since led to the discovery of almost 150 new animal species from the island. In 1998 WHT established a field station and taxonomic reference collection at Agrapatana, in Sri Lanka's central highlands, together with a montane-forest restoration project, for which Rohan won a Rolex Award for Enterprise in 2000. WHT's publishing company has to date produced almost 40 biodiversity-relevant books, including pioneering titles in Sinhala; proceeds from these are channelled into conservation and research projects in Sri Lanka.

Rohan divides his time between Agrapatana and Colombo, where he lives with his wife and two sons.

Pearls, Spices and Green Gold
An illustrated history of biodiversity exploration in Sri Lanka

The sexologist who adored ants
The village boy who delineated plants
The liberated sailor who 'discovered' marijuana
The impoverished gardener who portrayed birds
And many more...

The Indian Roller or Blue Jay (*Coracias benghalensis*), illustrated in George Edwards' (1758) *Gleanings of Natural History*, based on a drawing made from a Sri Lankan specimen by Pieter Cornelis De Bevere, in the collection of Joan Gideon Loten (1710–1789).

The fascinating story of the discovery of Sri Lanka's biodiversity, from the beginnings of European colonization to the post-Independence era, is told through the lives of the explorers, artists and scientists who discovered, depicted and described the island's plants and animals. Some famous, some obscure, many hitherto barely known, the stories of the men and women—for the most part amateurs and dilettantes—who laboured to describe the wealth of a biodiversity hotspot, are told for the first time.

Embellished with some 300 photographs, including paintings, prints and portraits of all the key figures (many published for the first time), *Pearls, Spices and Green Gold* helps put into context all that is known of Sri Lanka's fauna and flora, providing faces for familiar names in the island's biodiversity literature, and biographies for many of those otherwise uncommemorated. It is a tale that has its roots in colonial exploitation and greed, transformed in the course of half a millennium to a desperate struggle to describe vanishing species even as Sri Lanka's forests were being cut down at an unprecedented rate to provide the world with coffee, cinchona, tea and rubber.

Pearls, Spices and Green Gold is an invaluable source-book of biographical and historical information for anyone interested in Sri Lankan natural history.

Cover photograph: flowers from a country garden at Agrapatana, Sri Lanka—*Phaius tancarvilleae, Rubus gardnerianus, Schumacheria alnifolia, Rhodomyrtus tomentosa, Osbeckia rubicunda, Strobilanthes nockii, Cinnamomum ovalifolium, Eriocaulon ceylanicum, Microglossa zeylanica, Rauvolfia densiflora*. The green fruits at the lower left are coffee beans (*Coffea arabica*), together with tea flowers (*Camellia sinensis*); on the lower right is a bundle of cinnamon (*Cinnamomum verum*) quills draped in a string of pearls.

SCRIPTAE SCRIPTAS MANET
WHT
COLOMBO

PETHIYAGODA

PEARLS, SPICES AND GREEN GOLD

SCRIPTAE SCRIPTAS MANET
WHT
COLOMBO

Pearls, Spices and Green Gold
An Illustrated History of Biodiversity Exploration in Sri Lanka

Rohan Pethiyagoda

Together with the Western Ghats of India, Sri Lanka is part of a Global Biodiversity Hotspot: it contains an extraordinary wealth of species. Since the description of the island's biodiversity began with European colonization in the 16th century, tens of thousands of plants and animals have been collected, preserved in herbaria and museums, and scientifically described and illustrated. Early exploration in Sri Lanka focused on medicinal plants and the spice trade—for both of which the island had been famous since classical times. Later, investigations of the equally famous pearl fishery attracted zoologists to the island. The scientists recruited to these ends in many cases undertook also the wider exploration of Sri Lanka's natural wealth.

Sri Lanka's was among the first tropical biotas ever to be explored. Between 1717 and 1747 alone, for example, three 'floras' were published, the last of them by none less than Carolus Linnaeus. In 1821, the Royal Botanic Gardens opened at Peradeniya, providing a further impetus to natural history exploration. By 1864 Sri Lanka boasted of "the only completed flora of any tropical region".

In the mid-1800s, hordes of impoverished Britons migrated to Sri Lanka to escape the European potato famines. Driven by poverty and a pioneering spirit, they burnt down the island's rain forests to grow coffee, cinchona, tea, rubber and almost anything else they could sell. Although their ethos was primarily exploitative, they brought with them a spirit of exploration and a tradition of scientific inquiry. Many of them were to become amateur natural-historians of extraordinary quality and productivity. In addition to exporting specimens to the world's museums, they attracted professional biologists to the island, further accelerating the pace of discovery. Then, as colonial occupation stabilized, a handful of native explorers joined their ranks, combing the jungles for novelties.

Pearls, Spices and Green Gold describes how Sri Lanka's impressive biodiversity inventory was built, largely by a hodgepodge of amateurs and dilettantes motivated by curiosity and driven by a love of nature. It follows the progress of natural history up to the early post-Independence era, when growing nationalism and illusions of sovereignty led to a distrust of 'western' systems—sadly, including science—and resulted in a sharp decline in exploration, an activity by then fraught with colonial overtones.

Pearls, Spices and Green Gold

An Illustrated History of Biodiversity Exploration in Sri Lanka

Courtesy of the Linnean Society of London

Pearls, spices and green gold is being published to celebrate the tercentenary of the birth of Carolus Linnaeus (*q.v.*, 23 May, 1707–10 January, 1778) who, in the preface to his (1747) *Flora Zeylanica,* presented the first history of natural-history exploration in Sri Lanka.

This portrait, after an original by Martin Hofmann at the Linnaeus Museum in Uppsala, shows Linnaeus in Saami (Laplander) costume: he was the first scientist to botanize extensively in Lapland, and published his *Flora Lapponica* in 1737.

Pearls, Spices and Green Gold

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Rohan Pethiyagoda

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for friendship and inspiration

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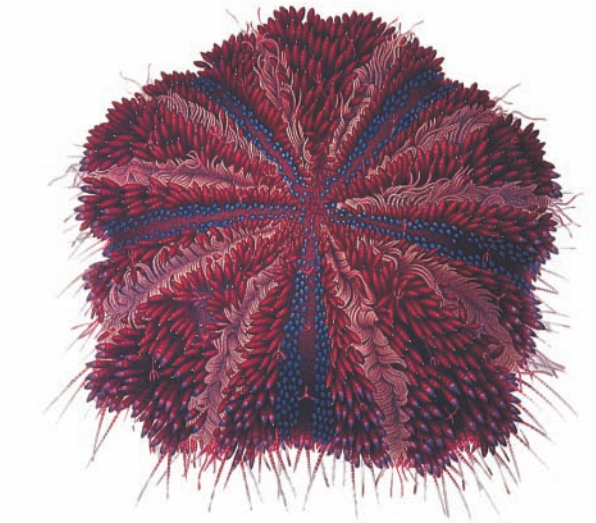

Asthenosoma urens, a new species of echinoid from Sri Lanka, described by the Sarasin cousins (*q.v.*) in their (1887–1908) *Ergebnisse naturwissenschaftlichter Forschungen auf Ceylon,* drawn by George de Alwis (*q.v.*), better known for his plant illustrations at the Royal Botanic Gardens, Peradeniya. In addition to delineating the species, the Sarasins detailed its anatomy, e.g., describing for the first time the sausage-like "organs of Stewart", which they named for Charles Stewart (1840–1907), who had predicted their existence in echinothurids a decade earlier (Stewart, 1879; see Lawrence, 2001). The Sarasins' anatomical analysis enabled them, also for the first time, to propose a phylogeny for the echinoderms (*Über die Anatomie der Echinothuriden und die Phylogenie der Echinodermen*) in the first volume of their four-part treatise.

Preface

This book was meant originally to be the 'historical background' chapter of a general text I had begun writing on the biodiversity of Sri Lanka. As it grew in size, however, it became clear that it would most practically be published as a separate volume; the tercentenary of the birth of Carl Linnaeus, on 23 May, 2007, suggested itself as an occasion well worth commemorating in Sri Lanka by way of this little tribute, and provided a handy deadline for its completion.

It is impossible to work on the biodiversity of a country without wondering about the people whose names are attached by taxonomic convention to the names of species. In reading the name, for example, of Layard's parakeet, "*Psittacula calthropae* Blyth, 1849", one could not help wondering, who was Blyth? Who was Calthrop (in the parakeet's name, Latinized to the feminine genitive singular, Calthropae)? How did Blyth, in Kolkata, come by specimens upon which to write his description? Who was Layard and how does he enter into the picture?

In the course of working visits to natural history museums and libraries during the past two decades, I sought answers to such questions for species of particular interest to me, gathering biographical notes on historical figures and whenever possible, their portraits. Over the years these portraits (of explorers and taxonomists both living and dead) grew in number and came to be hung in a 'rogues gallery' on a large wall at the Wildlife Heritage Trust's reference collection at Agarapatana, in Sri Lanka's central hills. The living were separated from the dead by a tall pillar in the middle of the wall, and occasionally, when one of the former passed beyond the veil, we would have a solemn little ceremony as his or her portrait was moved from one side to the other.

This gallery in time became a source of great amusement and interest to scientific visi-

tors to 'Agra', and questions about the history and biography of the people commemorated in the portraits would frequently be asked. Many visitors were surprised by what they learned—for example, that the great Carl Linnaeus wrote his only tropical flora on the plants of Sri Lanka, back in 1747. Yet, he never visited the island. How did he come by the hundreds of plant specimens catalogued in this book? Why did he choose the Sri Lankan flora for this project? What impact did his work have on botany?

While such questions inspired the research for this book, the answers were not, as a rule, easy to come by. Many early workers left but scant records of their life and work and it often happens that all we have to go on is a tombstone. In other cases, only manuscript records exist, hidden away in museum archives in Europe, often in languages other than English. In yet other cases, all seems lost.

Hundreds of people were associated with the modern discovery of Sri Lanka's fauna and flora, and in writing this account it has been necessary to pick and choose. A few important figures may inadvertently have been omitted; others may be treated in less detail than they deserve. When I began writing the text, I thought the flow of information would soon cease; as the work progressed, however, it became clear that the reverse was the case: it would never end. The Linnean tercentennial, then, proved a useful cut-off point to get this work into print, or it would have kept growing indefinitely.

This book deals primarily with the people who explored the wealth of Sri Lankan plants and animals—the collectors and the taxonomists who worked on their collections, and a handful of artists. It excludes those who made albeit important contributions to other fields, including ecology, forestry, fisheries, limnology and the like. Then again, a handful of people peripheral to biodiversity exploration have been included because they, in my opinion, help add context to the story of exploration in Sri Lanka.

Given that almost nothing is known about the pre-colonial exploration of the Sri Lankan biota, this account begins in the Portuguese period. Exploration gathered pace with the arrival of the Dutch and reached a peak around 1900, at the height of the British Raj. From there it dwindled and died almost altogether after Independence. Except for the plants (which benefitted from the Flora of Ceylon Project) and a few isolated but nevertheless important initiatives such as the Smithsonian Insect Project, the Lund University Expedition (1962) and the Austrian-Ceylonese Hydrobiological Expedition (1970), little happened by way of exploration in Sri Lanka since 1948. Such activity as there was I have documented up to the 1980s, when my own work began.

Since *ca* 1990, however, there has been something of a renaissance in biodiversity exploration, with a new generation of field workers showing increasing enthusiasm to publish their discoveries in the international scientific literature. Ironically, legislation enacted pursuant to the 1992 Convention on Biological Diversity has placed formidable regulatory obstacles in the way of natural history research, especially taxonomy, in Sri Lanka (Pethiyagoda *et al.,* 2006). At the same time, there is a growing divide between biodiversity scientists on the one side, and biodiversity managers and regulators on the other. None of this augers well for conservation efforts in the island, where large-scale extinctions across a variety of taxa have occurred in recent years (Pethiyagoda, 2005).

I have already commented elsewhere that the Sinhala (and for that matter, the Tamil) language does not contain a word for 'explorer' (Pethiyagoda, 2005). The modern Sinhala word, *gaveshanaya*, stems from the roots of 'searching for cattle'. Exploration, it seems, is not in Sri Lankan blood. As such,

the preponderant majority of people dealt with in this book are foreign.

I suspect critics of this book will point to the fact that while the history of botany is told through a narrative, that of zoology is told, in effect, through a series of obituaries alphabetically arranged. I apologize for this shortcoming while pleading that botanists almost from the beginning had a welcome home at the Peradeniya Herbarium while zoologists were denied such an advantage. Even after the Colombo Museum was established in 1877, it was never a meeting point for minds zoological and failed to engage successfully with the majority of natural historians active in the island.

This book is not intended as a contribution to the primary literature. I would have liked to have researched and described the lives of all my departed soul-mates in at least as much detail I have previously caused those of J. W. Bennett, Hippolyte Silvaf, E. F. Kelaart, Harmanis de Alwis, G. M. R. Henry and W. W. A. Philips to be detailed. The research effort called for by such an endeavour (much of which would necessarily have to take place in museums and archives in Europe), however, would be prohibitively expensive. However, some information on well-known figures such as Emerson Tennent, Legge and even Knox, I think many readers will find new.

Throughout the text, I have tried to provide references to relevant literature, either by citing the titles and dates of works, or by reference to the Literature Cited. Such citations, however, have been kept to a minimum, given that a text overly cluttered with dates, citations and footnotes would be excessively difficult to read. I have also avoided citing repeatedly in the text general biographical references such as Adler (1985), Agosti and Johnson (2005), Brummitt and Powell (1992), Desmond (1994), Groll (2006), Gunawardena (1968), and Woodward (1903).

I would like to hear from readers who discover errors and important omissions in this text. That would assist me greatly to bring out a second edition and—who knows?—perhaps even repair the gaping hole research on this project has left in my pension fund.

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How the sloth bear got its name

The rapid growth in trans-continental trade that accompanied the European discovery of maritime routes to Asia and the Americas *ca* 1500 led to cabinets of natural-history curiosities, comprising mainly of dried plants and animal skins, being shipped in ever greater numbers to naturalists in Europe. One of the best-known recipients of such cabinets was Albertus Seba (*q.v.*), who reported on these in his copiously illustrated *Locupletissimi rerum naturalium* (1734–65).

Seba had received a cabinet of specimens from Sri Lanka, sent on a Dutch East India Company vessel that had called also at Suriname (Dutch Guiana). There, it seems, more specimens were stuffed into the cabinet (it is not known whether by accident or mischief). When Seba opened the crate in Amsterdam and separated its contents, he was able to piece together the sloth illustrated on Plate 34 of his book (reproduced above), which he named 'Tardigradus ceilanicus', believing it to have been from Sri Lanka, as stated on the crate. Interestingly, the cabinet contained, in addition to other specimens from Sri Lanka (see other references to Seba in the Index), also a few mutilated parts of a bear, including the claws, which coincidentally are of a shape and colour similar to those of a three-toed sloth, adding verisimilitude to Seba's conclusion (Erdbrink, 1953).

As a result, for almost a century hence, it was generally assumed that sloths occurred naturally in both Asia and tropical Amercia. Even Linnaeus, in naming the two-toed sloth *Bradypus didactylus* in his (1758) *Systema Naturae*, gave its type locality as "Habitat in Zeylona".

Finally, it was George Shaw in his *Naturalist's Miscellany* (1791), who gave the bear its current specific epithet, *ursinus*, based on a more recent specimen. By a bizarre coincidence, however, the upper incisors of this specimen were lacking, presumably having fallen off as the skull dried. Because sloths too, lack upper incisors, Shaw (no doubt prejudiced also by Seba's error), assigned the bear to the genus *Bradypus*—i.e., the three-toed sloths of tropical America. Shaw's name *Bradypus ursinus* (subsequently revised to *Melursus ursinus* by W. T. Blanford (*q.v.*) in his 1888 *Fauna of British India*), translates into English as 'bear sloth', which misleading appellation we have retained as the animal's common name up to the present time, albeit reversed as 'sloth bear'. Except for its five ivory-coloured claws (as opposed to the sloth's two or three), the South Asian 'sloth bear' bears no resemblance—and is not related—to the sloths; neither, as anyone who has seen sloth bears in the wild knows, are they particularly slow.

Acknowledgements

This book owes its existence to so many people that it is difficult to know where to begin the process of acknowledging their contributions.

The genesis of my interest in the history of natural history owes itself to Dr Priyantha Wijesinghe and Mr Ismeth Raheem, who for many years have been a source of inspiration and guidance. This book would have been much the poorer but for the many snippets of information—and the many pointers to interesting personalities—with which they readily supplied me.

Dr Maurice Kottelat, Dr Indraneil Das and the late Mr Alwynne Wheeler, too, were sources of great inspiration and information; over the years, they generously supported my researches by sharing liberally of their extensive knowledge of the history of natural history, often pointing to details I had overlooked. I thank them also for companionship in what has otherwise been a lonely pursuit.

In Sri Lanka, I am grateful to Dr Jennifer Pastorini for translating German texts into English for me, and for assistance in tracking down source literature; and to Ms Udeshika de Silva for the translation of French texts. Several other colleagues helped with sourcing obscure details, including Mr Anslem de Silva, Mr Nimal Jayawardena, Mr Jayantha Jayewardene, Mr Gehan de Silva Wijeyeratne, Mr Amanda Weerasinghe, Professors Nimal and Savitri Gunatilleke, and Dr Michael and Mrs Nancy van der Poorten. I am also grateful to Mr Hemantha Situge for information on and a portrait of V. Atukorale and to Dr Siran U. Deraniyagala for giving me access to his father's (P. E. P. Deraniyagala's) collection of drawings.

The Director of National Botanic Gardens, Dr Siril Wijesundera has, over the years, been a ready source of help and encouragement. As head of Sri Lanka's oldest surviving institution, his respect for history and his appreciation of heritage are a refreshing contrast to the apathy of most government institutions.

It is with sincere gratitude that I acknowledge the assistance given to me by the librarians of key institutions in the United Kingdom many of whom went out of their way to obtain material for me. Among them the following must be especially mentioned: Ms Gina Douglas and Ms Lynda Brooks (portraits and documents in the Linnean Society of London), Dr Robert Nash (biography and drawings of Robert Templeton in the Ulster Museum, Belfast); Mr James Kay (paintings of Marianne North at the Royal Botanic Gardens, Kew); Ms Sylvia Fitzgerald and Ms Cheryl Piggot (manuscripts and drawings in the collection of the RBG, Kew); Dr Monika Shaffer-Fehre (materials in the collection of RBG, Kew); Ms Jennifer Vine (portraits in the collection of the Royal Horticultural Society, London); Mr David Taylor (portrait of Robert Knox at the National Maritime Museum, Greenwich); Dr Alec Coles (archives of E. F. Kelaart in the Hancock Museum, Newcastle); Dr A. Mc Veigh (archives of James Emerson Tennent in the Public Record Office of North-

ern Ireland, Belfast); Ms Christine Reynolds (Muniment Room and Library, Westminster Abbey, London); Ms Lynda Unchern (Cambridge University Library); and the librarians of the Africa and Asia Collections at the British Library, London.

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Archivists and curators in other European institutions have been no less helpful in kindly sending me biographical data on and portraits of biologists, and I acknowledge with thanks the generous contributions made by the following: Dr. Eckhard K. Groll and Ms Editha Schubert (Kustos der Sammlung Hemimetabola, Deutsches Entomologisches Institut (DEI), Müncheberg: see Groll, 2006); Dr Ambrose Haenggi (the archives of Paul and Fritz Sarasin at the Naturhistorisches Museum, Basel); Dr Thomas Bach (paintings in the collection of "Ernst-Haeckel-Haus", Friedrich Schiller Universität Jena); Prof. Alain Dubois, Dr Annemarie Ohler and Dr Marie Louise Bauchot (Muséum National d'Histoire Naturelle, Paris); Dr Claude Weber (Muséum d'histoire naturelle de la Ville de Genève); and Dr Ralf Thiel (Biocenter Grindel und Zoological Museum, University of Hamburg).

To the librarians and scientists of The Natural History Museum, London, I owe special thanks for their hospitality and ready assistance. The late Mr Alwynne Wheeler and Mr Gordon Howes were of immense help in tracking down obscure details on Sri Lankan natural history in my visits to their institution in the early 1990s. Ms Ann Datta (Zoology Library), Mr Malcolm Beasley (Botany Library) and Ms Julie Harvey (Entomology Library) provided ready access to collections in their care, while to Mr Oliver Crimmen and Mr Colin McCarthy, managers of the ichthyology and herpetology collections, respectively, I owe much gratitude for patient attention and many kindnesses during repeated visits. My grateful thanks also to Dr Dinarzarde Raheem for readily responding to countless requests for literature and other assistance.

Parts of different versions of the manuscript were read and commented on by Mr Ismeth Raheem, Dr Upatissa Pethiyagoda, Prof. Maliyasena D. Dassanayake and Dr Priyantha Wijesinghe. While thanking them for their meticulous attention to detail, and for drawing my attention to numerous errors and omissions, I absolve them of all responsibility for any errors that remain. I am also grateful to Mr Raheem for copious supplementary notes not incorporated in this text; these, if anything, demonstrate that there is ample room for a further work dealing with Sri Lankan contributions to the progress of science in Europe, and the history of scientific illustration.

Finally, my gratitude to Mr Fred Naggs (The Natural History Museum, London), who contributed much information, opened many doors to me—not least his own—and put me in touch with helpful friends and colleagues both in the NHM and throughout Great Britain; and Mrs Suzie Naggs, who lavished on me gracious hospitality on visits to London, in between lugging without complaint some 38 of kilogrammes of historical literature delivered to her door to safety upstairs.

Pearls, Spices and Green Gold

Time.	Latitude by Observation	Longitude by Chronometer.	Specific gravity of sea water at temp. 80.	Maximum temp. of the air in the 24 hours.	Minimum.	Mean.	Maximum temp. of the sea in the 24 hours.	Minimum.	Mean.	Barometer.	Winds.	Weather, &c.
	° ′	° ′		° ′	° ′	° ′	° ′	° ′	° ′	′		
June 15	S. 35,31	W 36,		65,	59,	61, 3	64, 5	63, 5	63, 9	30,3	W by N, SW	
16	24,23	37,56		62,	60,75	61, 5	65, 5	64,	65,	29,8	SE, NW	Cloudy.
17	34,44	40, 7		65,	58,	61, 6	65,	61,	64,	30,3	NW, SE by S	A thunder storm.
18	33,48	42, 3		60,	58, 5	59, 5	65,	62,	63, 4	30,6	E by S	Pleasant.
19	34,48	42,24		63,	59, 5	61,	64,	61, 5	63,	30 to 31	NE	Cloudy, tempestuous, showery.
20	34,54	45,17		63,	61,	62,	64,	62,	62, 7	30,1	N	Incessant rain and thunder and lightning.
21	35, 7	48,40		63,	58,	61,	62,	60,	60, 9	30,	WNW	Improving.
22	34,34	51,35		62,	57,	59, 8	62,	60,	60, 9	30,1	W	
23	33,36	55,16		60,	57,	58, 7	62,25	61,	61, 5	30,1	W by S	Moderate.
24	32, 4	58,18	10260	60,	57,25	58, 3	62,25	61, 5	62,	30,1	SW, SE	Pleasant.
25	31, 2	60,		59,	56, 5	57, 3	62,	60,75	61, 2	30,1	NNW	Gloomy.
26	30,39	60,33		59,	57,	57, 2	63,	61,	61, 8	30,3	E by S, ENE	
27	30,48	60,36		61, 5	59, 5	60, 6	61, 5	60,25	61, 3	30,3	NE	
28	31,23	63,17		63,	61, 5	62, 5	63,75	62,	62, 5	30,2	N by E	
29	31,20	64,34		63, 5	62,	63,	63,75	61,	62, 5	30,1		
30	30,53	65,38		67,	62, 5	63,	65, 5	63, 5	64, 5	30,4	N, W by N	Fair.
July 1	30,58	65,45		66,	61, 5	63, 6	65,	63,25	63, 6	30,2	SW	Gloomy, some rain.
2	29,23	66,17		62,	62,	60, 7	67,	64,	65, 5	30,3	SE	Fair.
3	27,18	66,30		64,	60,	62, 4	68,75	65,75	67, 3	30,4	E	
4	24,45	65,45		67,	64, 5	65, 8	70 75	68,	69, 4	30,3	E by S, E by N	
5	21,45	65,25	10259	69,	67,	68,	72,	70,	71,	30,4	SE	
6	19,53	63, 1		71,	68,	69,	74.	72,	72, 5	30,		Off Rodriguez.
7	19,44	62,50		71,	69,	69, 5	73, 5	71, 5	72, 3	30,2	S by W	At night in sight of the Isle of France.
17	19,15	57,11		72,75	71,	71, 6	74, 5	72,	73,	30,1	E by S	Fair, out of sight of land.
18	18,14	57,30		74, 0	72,	72, 3	74,	72, 5	74, 7	30,2	E	
19	17, 6	57, 3		74, 5	72,	73, 4	75,	72, 5	74,	30,2	E by S	
20	15,46	58,		74, 5	72, 5	73, 6	76,25	75,	75, 8	30,2	ESE	Showers.
21	14,22	58,48		75,	74, 5	74, 7	76, 5	75,	76,	30,2	E	Night squally.
22	12,17	59, 3		76, 5	73, 5	75, 1	77,	74,25	75, 6	30,2	E by S	Fair.
23	10,12	60,		77,	74,75	75, 1	77, 5	75,	76,25	30,		
24	7,54	60,23		77, 5	72,	74, 6	77, 5	75,	75,75	30,		—— night squally.
25	5,42	60,51		76,	75,	75, 4	77,	75, 5	76, 2	30,1	SE	Squalls with rain.
26	4, 6	61,45		78,	76,	77,	78,25	75,75	76, 5			
27	2,40	62,51		78,	76,25	77,	79, 5	78, 5	79,		E by N	Cloudy, squalls with rain.
28	1,40	63,35	10253	79, 5	77, 5	78,	81,	77,	79, 1		NE	Improving.
29	1,14	63,30		79,	75, 5	78,	80, 5	78,	79, 4			Rainy night.
30	0,19	65,11		78,25	77,	77, 8	81,	79,	80, 2		SE	Pleasant.
31	N 0,22	66,36		81,	73, 5	77, 5	82, 5	78,	80, 5		W by N	Day calm, night rainy.
Aug. 1	0,30	67,52		77,75	75,	77.	80, 5	79, 5	80,		S by W	Much rain.
2	0,26	68,58		78,	76,	77, 5	81,	80,	80, 4		S by E, S by W	Unsettled, some rain.
3	0,58	70, 6		81,	78, 5	79, 9	81, 5	80,	80, 7		SSW	Fine
4	1,27	71,51		80, 5	78,75	79, 9	81,75	80,	80, 7		S by W	
5	1,17	73,53		81,	79,	79, 5	81, 5	79,75	81,		S	
6	1,37	75,36		80, 5	78,	79, 9	81,75	79, 5	80, 6		SW	
7	2,10	76,37		82,	76,	78, 8	83, 5	80,	81, 7		SW by W	Part of the day calm.
8	2,34	77,25		81,	77, 5	79, 6	82,25	79,25	80, 7		N by W	Pleasant.
9	2,30	77,53		82,	75, 5	77,	84,	78, 5	80, 3			Calm.
10	3,22	79, 4		79,75	77,	77, 6	79,75	78,25	79,			Calm till 4 P. M.
11	5,17	79,42		79,75	76,25	77, 6	79,	76,	77, 5		NW	Frequent squalls.
12	6,24			77,75	75,75	76, 6	78,	76,	76, 9		WNW	Pleasant, in sight of Ceylon, in soundings.

Meteorological observations made on part of his voyage to Sri Lanka by John Davy (from east of the African cape, past the Mascarene Islands and to Sri Lanka) communicated to his brother, Humphrey, from Colombo on 3 November, 1816 (Davy, 1817).

The quest for cinnamon

*Moreover the Lord spake unto Moses, saying, Take thou also unto thee principal spices, of pure myrrh five hundred shekels, and of sweet cinnamon half so much... And thou shalt make it an oil of holy ointment, an ointment compound after the art of the apothecary: it shall be an holy anointing oil (*The Bible, *Exodus,* 30: 22–25*).*

Repeated mentions in the Bible, from *Exodus* to *Revelations*, paint cinnamon as a commodity not only of great antiquity, but also of great value. It has from ancient times been associated with luxury and sensuality: 'I have perfumed my bed with myrrh, aloes and cinnamon. Come, let us take our fill of love until the morning' (*Proverbs*, 7: 16–17). But the spice was valued not only among the Hebrews; it was also used for embalming and witchery in ancient Egypt and as a flavouring and fragrance in Rome.

True cinnamon, *Cinnamomum verum*, is considered to have been endemic to the moist lowlands of southwest Sri Lanka (Kostermans, 1995, in Dassanayake *et al*., 1980–2006), though it is now widely cultivated. Many of the *ca* 250 species of the genus have an aromatic bark, about one percent (by weight) of which is the volatile oil containing cinnamaldehyde, responsible for cinnamon's unique fragrance. Almost every historical account of cinnamon acknowledges that Sri Lanka's *C. verum* produces a scent far superior to that of other species; as a consequence, 'Ceylon cinnamon' continues even today to command the highest prices for this spice, which is now cultivated throughout the world's tropics, especially the Seychelles and Madagascar.

Cinnamon is a tree (in cultivation, a woody shrub) that, when pollarded, produces suckers known as 'water sprouts'. These are harvested, slowly dried (the leaves being trimmed off), cut into twigs and hand-peeled. The inner bark is then dried and scraped free of the epidermis, producing smooth, hollow, tube-like distinctively 'cinnamon-coloured' quills that are then tied into bales for trade. The quality of cinnamon is greatly dependent on the method of curing and peeling, and by tradition it is a special and ancient caste of people, the Saala or Salagama, that has for generations practised this art in the southwest of Sri Lanka.

It appears that pre-Christian links between Sri Lanka and the Middle East were suffi-

Cinnamon peelers 'removing the bark from the cinnamon cane', a photograph by John Abercromby Alexander, taken in southern Sri Lanka *ca* 1890. Alexander (born 1854), who was among the first foresters appointed to the newly-formed Forest Department in 1885, was evidently a planter in the island previously. He later served as Assistant Conservator of Forests of the Central Province, 1889–93. In 1896 he tranferred to India, where he was until 1898 a planter on Venture Estate, Kalthuritty, Kerala, after which he returned to England. Some years later, he served at Beira, Mozambique.

ciently good to have facilitated a trade in cinnamon (Schoff, 1912; Rawlinson, 1926; Warmington, 1928). Plants of value were transported great distances at the time: bananas, for example, reached Uganda from Asia as long ago as the fourth millennium, BC, and domestic chickens from Asia made it to Egypt by the eighteenth dynasty (1567–1320 BC) (Lejju *et al.,* 2006). No doubt early attempts were made to transplant cinnamon too, to other parts of the world; while cultivation might have been successful (as indeed it is even today), the secret appears to have lain at least in part in the art of the 'peelers' of the ancient Salagama clan, who process the spice with great skill so as to maximize its aroma and flavour.

Among the earliest historical mention of cinnamon in Sri Lanka was that of the Berber traveller, Ibn Batuta (1304–77), who visited the island, landing at Puttalam in the mid-fourteenth century. Though fascinated mainly by the impressive variety of gems, Batuta also noted of the island, in passing, "The whole of its shore abounds with cinnamon wood." And when he called on the local prince: "One day, when I was admitted to his presence, he had with him a great number of pearls, which had been brought from the pearl-fishery, and these his companions were sorting. He asked

Some Additions to the foregoing Account, by Albertus Seba. *F. R. S.*

AS a farther Explanation of this curious Account of the Cinnamon Trees, it will not be amiſs to ſubjoin the following Obſervations. Having ſome Years ago bought out of the *Eaſt-India* Company's Warehouſes at *Amſterdam*, a conſiderable Quantity of Cinnamon Leaves, or *Folia Malabathri*, pack'd up in ſeveral large Cheſts, I happen'd to find in one of them the Flowers of the Cinnamon, as big as the *Italian* Bean-flowers, and of a blue Colour; I chanced likewiſe to meet with the Fruit. But I could not find either in any of the other Cheſts.

In 1722 and 1723, I bought of the ſame Company the Oil, which is expreſſed out of the Fruit of the Cinnamon Tree, as alſo that which is boil'd out of them, which is of a very good Conſiſtence and white, and is by the *Eaſt-India* Company called Cinnamon Wax, becauſe the King of *Candia* cauſes Candles to be made out of it, which for their agreeable Scent, are burnt only by himſelf and at his Court. However he permits his Subjects to expreſs the Juice out of another Fruit, not unlike the Fruit of the Cinnamon Tree; but this Juice being only a thin fat Subſtance, like Oil of Olives, they cannot burn it any otherwiſe but in Lamps.

The *Indians* uſe this Cinnamon Wax alſo in Phyſick, and give it inwardly in Luxations, Fractures, Falls, Contuſions and Bruiſes, that in caſe any inward Part be touch'd or bruiſed, it may by its Balſamick

Virtues heal them. They give it alſo in Bloody Fluxes to one Dram or a Dram and a half. Outwardly applied, it makes the Skin more beautiful, ſmoother and ſofter, than any one known ſort of Pomade.

The Leaves of the Cinnamon Tree yield alſo an Oil, which is of a bitteriſh Taſte, reſembling Oil of Cloves mix'd with a little good Oil of Cinnamon. It is called *Oleum Malabathri*, or Oil of Cinnamon Leaves. It is an Aromatick, and is reckoned an excellent Remedy in Headaches, Pains of the Stomach, and other Diſtempers.

The Oil of the Root of the Cinnamon Tree is, properly ſpeaking, an Oil of Camphire, the Roots affording a good Quantity of Camphire. About two Years ago, or ſomewhat longer, I bought a Bottle of it of our *Eaſt-India* Company at my own Price. There were ſeveral Bottles together in a Box, upon which was wrote in Low Dutch *Deſe Oliteyten ſyn tot een geſchenk nyt Candia geſchikt*; that is, *theſe Oils were ſent as a Preſent out of* Candia, which ſhews that they are genuine, without any Adulteration; accordingly they are very much eſteemed. If this Oil be diſtilled in Glaſs Veſſels, there comes over along with it, that ſort of Camphire which the *Indians* call *Camphire Baros*, or Camphire of *Borneo*, which ſhoots in thin tranſparent Chriſtals, forming a beautiful Variety of Trees on the Recipient, not unlike thoſe, which in very froſty Weather are to be ſeen upon Windows. This ſort of Camphire is of very great Efficacy in Phyſick, and is gathered and kept for the King of *Candia* his own Uſe, who eſteems it an excellent Cordial Medicine. But not only the Camphire of *Baros*, but alſo the Oil of Cam-

phire, which is drawn out of the Roots of the Cinnamon Tree, is a very great Cordial, if taken inwardly: It ſtrengthens the Stomach, expels Wind, and hath been found of great Uſe in arthritick and gouty Diſorders: It is alſo a Diuretick. The Doſe is ten or twelve Drops upon a bit of Sugar, or in a proper Vehicle. Outwardly it is applied in all arthritick Pains from Cold and Obſtructions, being rubb'd on the affected Part with a warm Hand, and it will preſently leſſen the Pain, and by Degrees take it off. It is now about ſix and thirty Years ſince, ſerving in the Shop of Mr. *Nicolas Dumbſtdorff* at *Amſterdam*, that Gentleman was then ſo cruelly afflicted with arthritick Pains, that he could have no Reſt neither Night nor Day; and although he called in the Aſſiſtance of ſeveral noted Phyſicians, and tried abundance of Medicines, yet he could find no Relief, till he was adviſed to cauſe himſelf to be anointed with the Oil of the Root of the Cinnamon Tree; of which he then happen'd to have a good Quantity by him. I remember very well, that I anointed him my ſelf, rubbing the Oil on all the affected Parts with my Hand warm'd by holding it to an Oven, and this I did twice every Day for an Hour together. And though, when this Cure was firſt begun with him, his Hands and Feet were by the Convulſions and the Violence of his Pain ſo contracted, that they grew quite crooked, and were full of Nodes, yet in a Fortnight's Time he grew ſo much better, that he could ſleep well at Nights, feeling neither Pains nor Cramps. In about ſix Weeks Time he could walk about his Room, whereas before the Anointing he was not able to ſtir either Hand or Foot. This Anointing was continued for about three Months, when the Patient not only recover'd of

that violent Indiſpoſition, but continued free from the Gout ever after, and lived about fifteen Years in a very good State of Health. And this I cannot only affirm to be true of my own certain Knowledge; but alſo, that ſince that Time I have adviſed ſeveral People in his Condition to do the ſame with as good Succeſs. Several Phyſicians have wrote largely of the Virtues of common Camphire, but there are as yet many hidden Qualities in this excellent Medicine. Thus, for Inſtance, I can affirm, that in all Burnings, by Fire or otherwiſe, in any Part of the Body, and the Pains occaſioned thereby, I have not yet met with any better and ſurer Medicine than this following.

℞. *Spir. Lumbricor. terreſtr. cum Spir. Vini rectificat* ʒxij. *Camphor.* ʒij. M.

No ſooner is a Bandage, or Compreſs, dipp'd into this Spirit, applied to the affected Part, but it will give inſtant Relief, and ſo effectually check the Inflammation, that it will creep no farther. But the Application of it muſt be continued till the Pain is quite gone, and the *Ulcus*, if there hath been any, is dried up. If the Exulceration is got deeper, and the Wound muſt be kept open, two Ounces of Camphire diſſolved in *Oleo Hyperici*, mix'd with a Pound of the common *Unguentum Ceruſſæ*, applied according to Art, will quickly and effectually heal it, as I have often experienced.

Albertus Seba's "An account of the cinnamon tree in Ceylon, and its several sorts" [trans. Johann Jakob Scheuchzer], published in 1729 in *Philosophical Transactions* (1683–1775), 36: 97–109. Seba obtained his information on Sri Lankan cinnamon from an unidentified "Chief Inspector of the cinnamon trade and manufacture" in the island, whose account contained a wealth of Sinhala words translated and explained by the author.

me, whether I had ever seen pearl-diving, in any country which I had visited..."

Among the earliest explorers to document his travels in Sri Lanka, Batuta went on to climb Adam's Peak: "This mountain of Serendib is one of the largest in the world: we saw it from the sea at the distance of nine days. When we ascended it, we saw the clouds passing between us and its foot. On it is a great number of trees, the leaves of which never fall. There are also flowers of various colours, with the red rose [evidently rhododendron], about the size of the palm of the hand, upon the leaves of which they think they can read the name of God and of his prophet" (quoted from Samuel Lee's translation in Skeen, 1870). Cinnamon was sufficiently valued as a spice in the ancient Mediterranean for Theophrastus of Erasia (*ca* 88 BC) and Pliny (*ca* 24–79 AD) to have described the method of peeling and curing the spice.

A cinnamon peeler at Ahungalla.

Burman (1737), probably based on notes by Johannes Hartog made during his time in the island, noted that nine different varieties of cinnamon were recognized by distinctive local names in Sri Lanka: Rasse Coronde [rasa kurundu], which he referred to as sweet or 'true' (*verum*) Cinnamomum; Cahette [kahata] Coronde; Cappare [kapuru] Coronde; Welle Coronde; Sewel Coronde; Nieke Coronde; Dawel Coronde; Catte [katu] Coronde; and Mael Coronde. These have not as yet been assigned to the eight (scientific) species of *Cinnamomum*, all of them endemic, known from Sri Lanka at present.

The earliest modern account of cinnamon in Sri Lanka appears to be that of Strachan (1702a). "There are two sorts of cinnamon-trees," he observed,

> of which the tree which is esteemed the best has a leaf much larger and thicker than the other, but otherwise no difference is perceived. If these leaves, as well as one sort as the other, be distilled, they yield an oyl and water, as if cloves had been in the still.
>
> Upon the root of this tree is a thick bark, which, when it is distilled, as the former, yields oyl and camphire also; which is separated by covering the receiver with a linnen cloath, and the camphire will remain in the cloath in a lump together, and the oyl and water will run into the receiver. This camphire has the same colour, the same discussing, dissolving and healing balsamick quality of the camphire of Japan; the oyl is of the same virtue; anointed upon scabs, itch and excoriations, it cures them in a short time.

Though valued as a commodity for export, Strachan stated that in his 17 years in Sri Lanka, he "never did see the natives make use

of cinnamon, although they scarcely have a meal without pepper".

The Swedish botanist Carl Peter Thunberg, who was commissioned to make a study of cinnamon during his visit in 1777–78, gave a more detailed account of the spice (Thunberg, 1780), in which he listed ten varieties, Rasse curundu (also known as Peni-curundu), Nai-curundu, Capuru-Curundu, Cahatte-Curundu, Saevel-Curundu, Dawul-Curundu, Nica-Curundu, Caturu-Curundu, Mal-Curundu, and Tom-pat-Curundu. It was about this time that the Dutch, during the tenure (1765–85) of Governor Iman Willem Falk [also spelt Ymen Wilhelm Falck], had begun planting cinnamon for the first time, being unable to rely on the quality of produce collected from the wild. "I was requested [in 1777], together with several physicians, to examine a large quantity of cinnamon, which had been furnished by the King of Candi", Thunberg wrote (1793). "Half of it was found to be adulterated and spoiled, tasteless and bad. The best of it, which could be selected from the mass, was forwarded to Batavia."

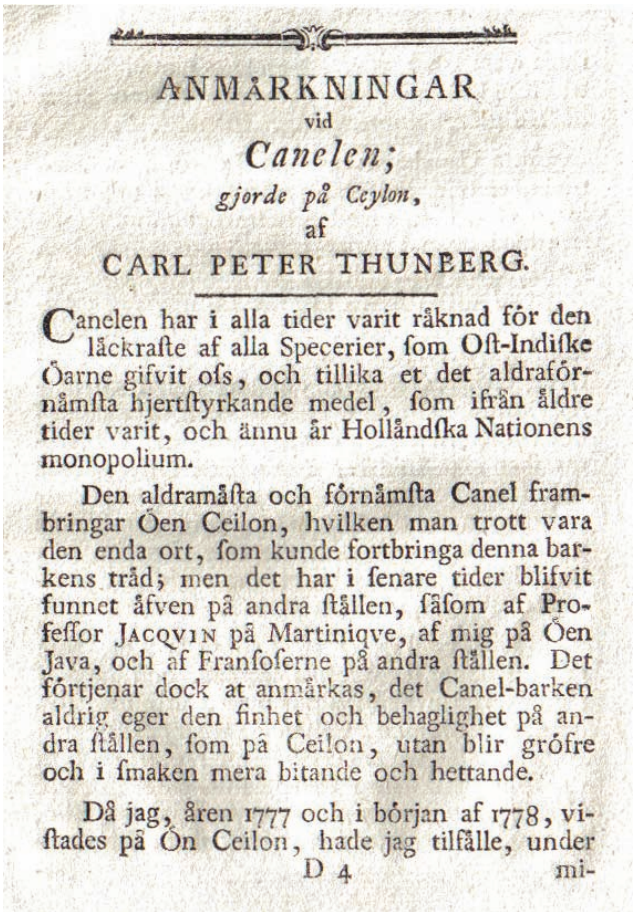
With the Dutch providing a ready market, cinnamon plantations were established by the Sinhalese themselves. "At Situwaka, which lies on the boundaries between the Emperor's domains in Candi and the territories of the [Dutch East India] Company," wrote Thunberg,

> there are very large cinnamon grounds, from whence cinnamon has been already three times barked, and from which likewise this year a quantity was sent to Europe... At Kalture and Mature I now had an opportunity of seeing with my own eyes exceedingly large plantations of cinnamon, which had been established two or three years before. When all these and several more of the same kind shall have attained their full growth, it will be inconceivably more convenient for the Dutch East-India Company to fetch their cinnamon from a garden, where the trees stand at proper distances and in rows, than for the Sehjalias to creep about far and wide in the pathless woods and seek to procure it. Add to this, that the cinnamon in the woods is greatly reduced in quantity, compared to former times; which is partly owing to this, that the portions of land which yielded the best cinnamon have been taken for other uses, and partly, that the cinnamon-trees in the wild forests were left without any guard."

"Cinnamon is the chief commodity which the East-India Company fetch from this island," he continued, "and the bark of this spice is here finer and more valuable than in any other place in the world. All prime cinnamon is taken from the *Laurus Cinnamomum*, a tree of middling height and size... The south-west angle of the island is the only part which produces the finer sort of this pleasant and excellent cordial spice, and the places, whence it is chiefly procured, are near Negumbo, Columbo, Caltere, Barbary, Gale, and Mature, all of which lie along and near the coast. The cinnamon, which the more inland parts produce, is always coarser, thicker, more pungent, and biting to the tongue.

Apart from Strachan's brief report in *Philosophical Transactions* (1702a), the first detailed British account of cinnamon appears to be that of Watson (1751), while Sri Lanka was still a Dutch colony. Watson had been in receipt, by a long and circuitous route, of a "specimen of the bark and wood of the cinnamon-tree, nearly half the length and size of an ordinary walking cane" smuggled out of Dutch Sri Lanka. His letter to the Royal Society of London (of which he was a fellow), shows just how valuable a commodity cinnamon was at the time, and gives an indication of the interest the British might have had in acquiring Sri Lanka for themselves.

> What we now call cinnamon", he wrote, "is only produced in Ceylon, of which the states of Holland are in possession; and so jealous are they of this tree, which affords so valuable an article of commerce, that the fruits or young plants are forbidden by an order of state to be



ANMÄRKNINGAR
vid
Canelen;
gjorde på Ceylon,
af
CARL PETER THUNBERG.

Canelen har i alla tider varit råknad för den läckraſte af alla Specerier, ſom Oſt-Indiſke Öarne gifvit oſs, och tillika et det aldraförnämſta hjertſtyrkande medel, ſom ifrån åldre tider varit, och ännu är Holländſka Nationens monopolium.

Den aldramåſta och förnämſta Canel frambringar Öen Ceilon, hvilken man trott vara den enda ort, ſom kunde fortbringa denna barkens tråd; men det har i ſenare tider blifvit funnet åfven på andra ſtållen, ſåſom af Profeſſor JACQVIN på Martiniqve, af mig på Öen Java, och af Franſoſerne på andra ſtållen. Det förtjenar dock at anmärkas, det Canel-barken aldrig eger den finhet och behaglighet på andra ſtållen, ſom på Ceilon, utan blir gröfre och i ſmaken mera bitande och hettande.

Då jag, åren 1777 och i början af 1778, viſtades på Ön Ceilon, hade jag tilfälle, under

D 4 mi-

C. P. Thunberg's (1780) account of cinnamon in Sri Lanka: *Anmärkningar vid Canelen; gjorde på Ceylon*.

considerable persons in Holland, and that they continued also as well in the gardens of others, as in his own, for two or three years, and were kill'd by a severe winter. I am very credibly informed, that three of these trees in pots were presented to the late King William, by whom they were placed in the garden at Hampton-court, and were intended to be sent to Jamaica, as a country proper for their increase, under the care of the Earl of Inchiquin, who was then going thither as governor. But for want of attention these trees were left behind; and as the knowledge of the hot-houses, as we now see them, was unknown, and the state of gardening otherwise extremely low, these invaluable trees were suffered to die here; whereas had they been planted in some of our islands in America between the tropics, in all probability before this time we might have been supplied from thence, and large sums been annually saved to the public, as great quantities of cinnamon are consumed in diet and medicine.

sent from thence, lest other powers might avail themselves thereof. And this they have hitherto been successful enough to keep to themselves; tho' in Ceylon, according to Mr. Ray, the cinnamon-tree grows as common as in the woods and hedges, as the hazel with us, nor is of greater esteem with the inhabitants than other wood, but is used by them as fuel, and applied to other domestic purposes. I am apprehensive, that the prohibition of sending cinnamon-trees from Ceylon is of no long standing, as Paul Herman, who resided there some time, and was after his return chosen professor of botany at Leyden, tells us, in his *Hortus Lugduni-Batavus* published in 1687, that he sent several of these trees to some

Cinnamon was, then, the bait that provided an economic foundation for visits to Sri Lanka by early botanists, a by-product of which were the herbaria they caused to be sent back to Europe, and the attention they drew to the island from their publications. In this respect, the genesis of European botanical exploration in Sri Lanka, founded as it was on the cinnamon economy, was somewhat different from that of Malabar. There, van Rheede was driven essentially by curiosity and wonder, and not so much by a need to demonstrate economic benefit to the colonizing nation.

Thus it was also that men of the ilk of Hermann, Burman, Thunberg and Kønig botanized in the island, causing Linnaeus to publish his only tropical flora, on the plants of Sri Lanka. Unlike the pearl fishery that failed a century ago, cinnamon remains an important export from Sri Lanka even today.

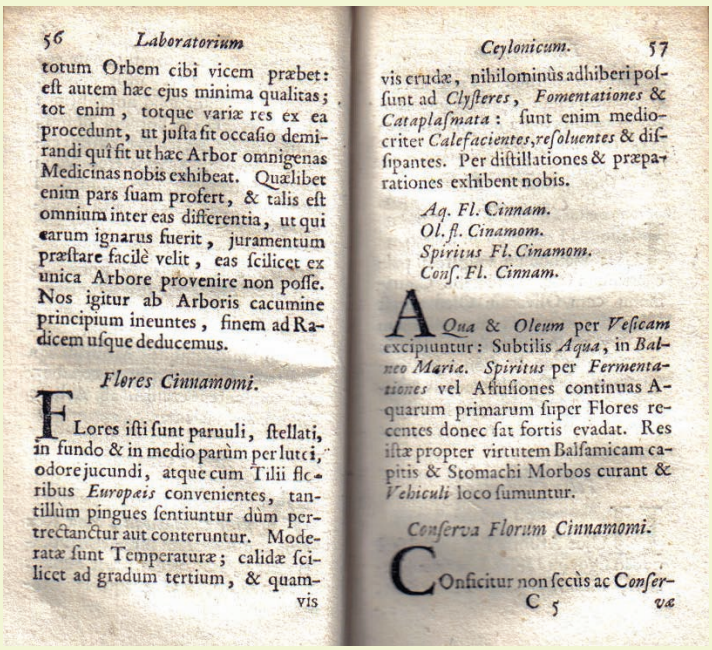
A spice by any other name

Until Carolus Linnaeus began consistently to use 'binomial' species names consisting of a generic name coupled with a specific epithet in 1753, botanists referred to plants only by descriptive Latin 'polynomials' and common names, which could change from place to place and between languages. Linnaeus's binomial system has survived for two-and-a-half centuries, during which time botanists have devoloped a detailed set of rules to regulate nomenclatural actions. The case of cinnamon serves to demonstrate how complex this can be.

Grimm's book on Sri Lankan herbal medicines, *Insulae Zeylaniae Thesaurus Medicus,* plagiarized and published by Bartholomeo Pielat in 1679 (Fig. 1), uses the Latin name *Cinnamomi* for cinnamon. In his *Museum Zeylanicum* (posthumous, 1717), Paul Herman (Fig. 2), while correctly noting the close relationship of cinnamon to the laurels, listed the Sinhala name kurudu (mentioning also that the correct pronunciation is *kurundu*), the Latin name cinnamomum and also the northern-European name, canelle. Importantly, Hermann preserved several herbarium specimens and drawings (e.g., Figs. 3 and 4, now in the Natural History Museum, London).

In his *Thesaurus Zeylanicus*, Burman (1737) referred to this species as Cinnamomum, listing also the names Canella Zeylanica and Laurus Zeylanica, while providing also a description (Fig. 5) and explicitly citing a specimen in the Hermann Herbarium. Burman also supplied a detailed illustration (Fig. 6). In his (1747) *Flora Zeylanica*, Linnaeus cited the names used by the preceding authors (Fig. 7), referred the species to the 'genus' *Laurus* and provided a brief diagnostic description of his own. Finally in his 1753 *Species Plantarum*, while retaining the genus Laurus, he gave cinnamon the species-epithet *Cinnamomum* (Fig. 8, see note on right margin): the binomial name of the species thereby became *Laurus cinnamomum.*

Later botanists came to realize that while cinnamon was related closely enough to the laurels to be included in the same family (Lauraceae), it was sufficiently distinct to warrant a separate genus. In 1760, Jacob Christian Schaeffer (1718–1790), in his *Botanica expeditior genera Plantarum,* used *Cinnamomum* as the generic-name for cinnamon.



56 *Laboratorium*

totum Orbem cibi vicem præbet: eſt autem hæc ejus minima qualitas; tot enim, totque variæ res ex ea procedunt, ut juſta ſit occaſio demirandi quî ſit ut hæc Arbor omnigenas Medicinas nobis exhibeat. Quælibet enim pars ſuam profert, & talis eſt omnium inter eas differentia, ut qui earum ignarus fuerit, juramentum præſtare facilè velit, eas ſcilicet ex unica Arbore provenire non poſſe. Nos igitur ab Arboris cacumine principium ineuntes, finem ad Radicem uſque deducemus.

Flores Cinnamomi.

FLores iſti ſunt paruuli, ſtellati, in fundo & in medio parùm per lutei, odore jucundi, atque cum Tilii floribus *Europæis* convenientes, tantillùm pingues ſentiuntur dùm pertrectantur aut conteruntur. Moderatæ ſunt Temperaturæ; calidæ ſcilicet ad gradum tertium, & quamvis

Ceylonicum. 57

vis crudæ, nihilominùs adhiberi poſſunt ad *Clyſteres*, *Fomentationes* & *Cataplaſmata*: ſunt enim mediocriter *Calefacientes*, *reſoluentes* & diſſipantes. Per diſtillationes & præparationes exhibent nobis.

Aq. Fl. Cinnam.
Ol. ſt. Cinamom.
Spiritus Fl. Cinamom.
Conſ. Fl. Cinnam.

AQua & *Oleum* per *Veſicam* excipiuntur: Subtilis *Aqua*, in *Balneo Mariæ*. *Spiritus* per *Fermentationes* vel Affuſiones continuas Aquarum primarum ſuper Flores recentes donec fat fortis evadat. Res iſtæ propter virtutem Balſamicam capitis & Stomachi Morbos curant & *Vehiculi* loco ſumuntur.

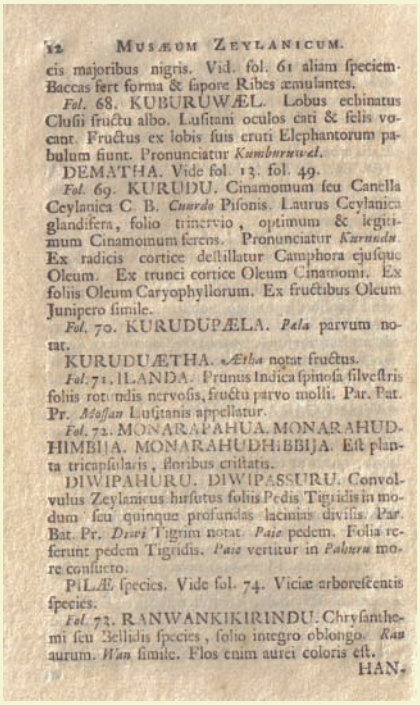
Conſerva Florum Cinnamomi.

COnficitur non ſecùs ac *Conſer-*

C 5 *væ*

Figure 1. Medicinal uses of cinnamon flowers, described in *Insulae Zeylaniae Thesaurus Medicus*, plagiarized from Nicholas Grimm and published by Bartholomeo Pielat in 1679.

Figure 2 (above), specimen, and **Figure 3** (below), drawing of cinnamon collected by Paul Hermann in Sri Lanka in the period 1672–79, in the collection of The Natural History Museum, London.



12 MUSÆUM ZEYLANICUM.

cis majoribus nigris. Vid. fol. 61 aliam ſpeciem. Baccas fert forma & ſapore Ribes æmulantes.

Fol. 68. KUBURUWÆL. Lobus echinatus Cluſii fructu albo. Luſitani oculos cati & felis vocant. Fructus ex lobis ſuis eruti Elephantorum pabulum fiunt. Pronunciatur *Kumburuwæl.*

DEMATHA. Vide fol. 13. fol. 49.

Fol. 69. KURUDU. Cinamomum ſeu Canella Ceylanica C. B. *Cuardo* Piſonis. Laurus Ceylanica glandifera, folio trinervio, optimum & legitimum Cinamomum ferens. Pronunciatur *Kurundu.* Ex radicis cortice deſtillatur Camphora ejuſque Oleum. Ex trunci cortice Oleum Cinamomi. Ex foliis Oleum Caryophyllorum. Ex fructibus Oleum Junipero ſimile.

Fol. 70. KURUDUPÆLA. *Pæla* parvum notat.

KURUDUÆTHA. *Ætha* notat fructus.

Fol. 71. ILANDA. Prunus Indica ſpinoſa ſilveſtris foliis rotundis nervoſis, fructu parvo molli. Par. Bat. Pr. *Atoſſan* Luſitanis appellatur.

Fol. 72. MONARAPAHUA. MONARAHUDHIMBIJA. MONARAHUDHIBBIJA. Eſt planta tricapſularis, floribus criſtatis.

DIWIPAHURU. DIWIPASSURU. Convolvulus Zeylanicus hirſutus foliis Pedis Tigridis in modum ſeu quinque profundas lacinias diviſis. Par. Bat. Pr. *Deeri* Tigrim notat. *Paie* pedem. Folia referunt pedem Tigridis. *Paie* vertitur in *Paluru* more conſuecto.

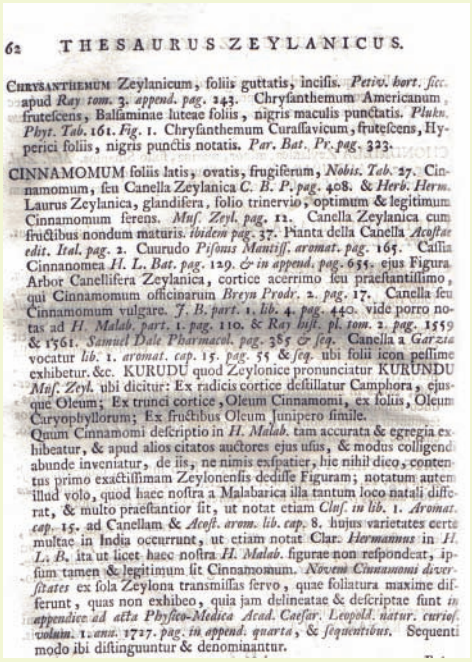
PILÆ ſpecies. Vide fol. 74. Viciæ arboreſcentis ſpecies.

Fol. 73. RANWANKIKIRINDU. Chryſanthemi ſeu Bellidis ſpecies, folio integro oblongo. *Ran* aurum. *Wan* ſimile. Flos enim auret coloris eſt.

HAN.

Figure 4. Description of cinnamon, KURUDU, in Paul Hermann's *Musaeum Zeylanicum* (1717).

The binomial for Linnaeus's *Laurus cinnamomum* would now become *Cinnamomum cinnamomum.* The rules of botanical nomenclature, however, do not permit the generic-name and specific epithet to be identical (a situation referred to as tautonymy), and given that the genus was now fixed as *Cinnamomum,* the next most senior species name in the literature had to be selected as the specific epithet. This epithet happens to have been *verum,* supplied by Jan Svatopluk Presl (1791–1849). By this convention, cinnamon comes to have the scientific name by which we know it today, *Cinnamomum verum.* While this is entirely different to the name Linnaeus coined for the species, the example shows the wealth of historical literature and herbarium material systematic botanists need to access in order to provide a stable nomenclature for the world's plants.



62 THESAURUS ZEYLANICUS.

CHRYSANTHEMUM Zeylanicum, foliis guttatis, incisis. *Petiv. hort. sicc.* apud *Ray tom.* 3. *append. pag.* 143. Chrysanthemum Americanum, fruteſcens, Balſaminae luteae foliis, nigris maculis punctatis. *Pluken. Phyt. Tab.* 161. *Fig.* 1. Chrysanthemum Curaſſavicum, fruteſcens, Hyperici foliis, nigris punctis notatis. *Par. Bat. Pr. pag.* 323.

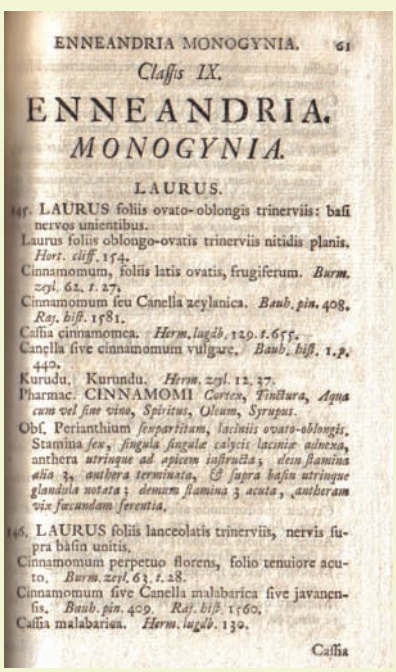
CINNAMOMUM foliis latis, ovatis, frugiferum, *Nobis. Tab.* 27. Cinnamomum, ſeu Canella Zeylanica *C. B. P. pag.* 408. & *Herb. Herm.* Laurus Zeylanica, glandifera, folio trinervio, optimum & legitimum Cinnamomum ferens. *Muſ. Zeyl. pag.* 12. Canella Zeylanica cum fructibus nondum maturis. *ibidem pag.* 37. Pianta della Canella *Acoſtae edit. Ital. pag.* 2. Curudo *Piſonis Mantiſſ. aromat. pag.* 165. Caſſia Cinnanomea *H. L. Bat. pag.* 129. *& in append. pag.* 655. ejus Figura. Arbor Canellifera Zeylanica, cortice acerrimo ſeu praeſtantiſſimo, qui Cinnamomum officinarum *Breyn Prodr.* 2. *pag.* 17. Canella ſeu Cinnamomum vulgare. *J. B. part.* 1. *lib.* 4. *pag.* 440. vide porro notas ad *H. Malab. part.* 1. *pag.* 110. & *Ray hiſt. pl. tom.* 2. *pag.* 1559 & 1561. *Samuel Dale Pharmacol. pag.* 385 *& ſeq.* Canella a *Garzia* vocatur *lib.* 1. *aromat. cap.* 15. *pag.* 55 *& ſeq.* ubi folii icon peſſime exhibetur. &c. KURUDU quod Zeylonice pronunciatur KURUNDU *Muſ. Zeyl.* ubi dicitur: Ex radicis cortice deſtillatur Camphora, ejusque Oleum; Ex trunci cortice, Oleum Cinnamomi, ex foliis, Oleum Caryophyllorum; Ex fructibus Oleum Junipero ſimile.

Quum Cinnamomi deſcriptio in *H. Malab.* tam accurata & egregia exhibeatur, & apud alios citatos auctores ejus uſus, & modus colligendi abunde inveniatur, de iis, ne nimis exſpatier, hic nihil dico, contentus primo exactiſſimam Zeylonenſis deduſſe Figuram; notatum autem illud volo, quod haec noſtra a Malabarica illa tantum loco natali differat, & multo praeſtantior ſit, ut notat etiam *Cluſ. in lib.* 1. *Aromat. cap.* 15. ad Canellam & *Acoſt. arom. lib. cap.* 8. hujus varietates certe multae in India occurrunt, ut etiam notat Clar. *Hermannus* in *H. L. B.* ita ut licet haec noſtra *H. Malab.* figurae non reſpondeat, ipſum tamen & legitimum ſit Cinnamomum. *Novem Cinnamomi diverſitates* ex ſola Zeylona transmiſſas ſervo, quae foliatura maxime differunt, quas non exhibeo, quia jam delineatae & deſcriptae ſunt *in appendice ad acta Phyſico-Medica Acad. Caeſar. Leopold. natur. curioſ. volum.* 1. *anno.* 1727. *pag. in append. quarta*, & *ſequentibus.* Sequenti modo ibi diſtinguuntur & denominantur.

Pag. 62. Tab. 27.

CINNAMOMUM *foliis latis, ovatis frugiferum. Nobis.*

Figure 5 (above left), description and **Figure 6** (above right) illustration of cinnamon, CINNAMOMUM, in Johannes Burman's *Thesaurus Zeylanicus* (1737).



ENNEANDRIA MONOGYNIA. 61

Claſſis IX.

ENNEANDRIA.

MONOGYNIA.

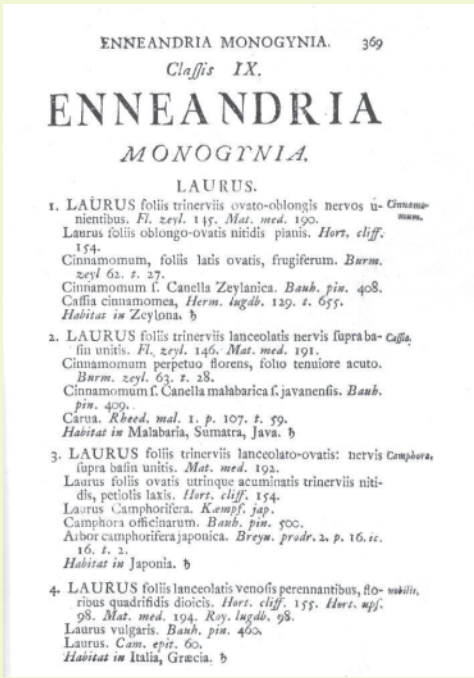
LAURUS.

145. LAURUS foliis ovato-oblongis trinerviis: baſi nervos unientibus.
Laurus foliis oblongo-ovatis trinerviis nitidis planis. *Hort. cliff.* 154.
Cinnamomum, foliis latis ovatis, frugiferum. *Burm. zeyl.* 62. *t.* 27.
Cinnamomum ſeu Canella zeylanica. *Baub. pin.* 408. *Ray. hiſt.* 1581.
Caſſia cinnamomea. *Herm. lugdb.* 129. *t.* 655.
Canella ſive cinnamomum vulgare. *Baub. hiſt.* 1. *p.* 440.
Kurudu. Kurundu. *Herm. zeyl.* 12. 27.
Pharmac. CINNAMOMI *Cortex, Tinctura, Aqua cum vel ſine vino, Spiritus, Oleum, Syrupus.*
Obſ. Perianthium *ſemipartitum, laciniis ovato-oblongis.* Stamina *ſex, ſingula ſingulae calycis laciniae adnexa,* anthera *utrinque ad apicem inſtructa; dein ſtamina alia* 3, *anthera terminata, & ſupra baſin utrinque glandula notata; denum ſtamina* 3 *acuta, antheram vix fecundam ferentia.*

146. LAURUS foliis lanceolatis trinerviis, nervis ſupra baſin unitis.
Cinnamomum perpetuo florens, folio tenuiore acuto. *Burm. zeyl.* 63. *t.* 28.
Cinnamomum ſive Canella malabarica ſive javanenſis. *Baub. pin.* 409. *Raj. hiſt.* 1760.
Caſſia malabarica. *Herm. lugdb.* 130.

Caſſia

Figure 7. Linnaeus's description of cinnamon in his 1747 *Flora Zeylanica*.



ENNEANDRIA MONOGYNIA. 369

Claſſis IX.

ENNEANDRIA

MONOGYNIA.

LAURUS.

1. LAURUS foliis trinerviis ovato-oblongis nervos u- Cinnamomum.
nientibus. *Fl. zeyl.* 145. *Mat. med.* 190.
Laurus foliis oblongo-ovatis nitidis planis. *Hort. cliff.* 154.
Cinnamomum, foliis latis ovatis, frugiferum. *Burm. zeyl* 62. *t.* 27.
Cinnamomum ſ. Canella Zeylanica. *Bauh. pin.* 408.
Caſſia cinnamomea, *Herm. lugdb.* 129. *t.* 655.
Habitat in Zeylona. ♄

2. LAURUS foliis trinerviis lanceolatis nervis ſupra ba- Caſſia.
ſin unitis. *Fl. zeyl.* 146. *Mat. med.* 191.
Cinnamomum perpetuo florens, folio tenuiore acuto. *Burm. zeyl.* 63. *t.* 28.
Cinnamomum ſ. Canella malabarica ſ. javanenſis. *Baub. pin.* 409.
Carua. *Rheed. mal.* 1. *p.* 107. *t.* 59.
Habitat in Malabaria, Sumatra, Java. ♄

3. LAURUS foliis trinerviis lanceolato-ovatis: nervis Camphora.
ſupra baſin unitis. *Mat. med.* 192.
Laurus foliis ovatis utrinque acuminatis trinerviis nitidis, petiolis laxis. *Hort. cliff.* 154.
Laurus Camphorifera. *Kæmpf. jap.*
Camphora officinarum. *Bauh. pin.* 500.
Arbor camphorifera japonica. *Breyn. prodr.* 2. *p.* 16. *ic.* 16. *t.* 2.
Habitat in Japonia. ♄

4. LAURUS foliis lanceolatis venoſis perennantibus, flo- nobilis.
ribus quadrifidis dioicis. *Hort. cliff.* 155. *Hort. upſ.* 98. *Mat. med.* 194. *Roy. lugdb.* 98.
Laurus vulgaris. *Bauh. pin.* 460.
Laurus. *Cam. epit.* 60.
Habitat in Italia, Græcia. ♄

Figure 8. The first scientific description of cinnamon, in Linnaeus's (1753) *Species Plantarum.*

'A box containing specimens of the shells of pearl oysters of various ages taken from the Ceylon pearl banks in the Gulf of Manaar', deposited in the Natural History Museum, London, by Captain James Stuart, Master Attendant at Colombo, in 1868 (see p. 30). In drawing my attention to this, Mr Ismeth Raheem (*in litt.*) noted that the unsigned watercolour dated 1828 on the inside lid of the box, of the pearl fishery at Mannar, appears to be the work of Hippolyte Silvaf (*q.v.*). In addition to a representation of the landscape, the drawing provides a wealth of detail on the fishery, including the type and number of craft used, contemporary costumes, and modes of transport. Note the mass of people, presumably merchants, gathered on the beach and the secured enclosure on the right, in which the oysters are heaped (image courtesy of The Natural History Museum, London).

The search for pearls

"Sir, what is a pearl?"

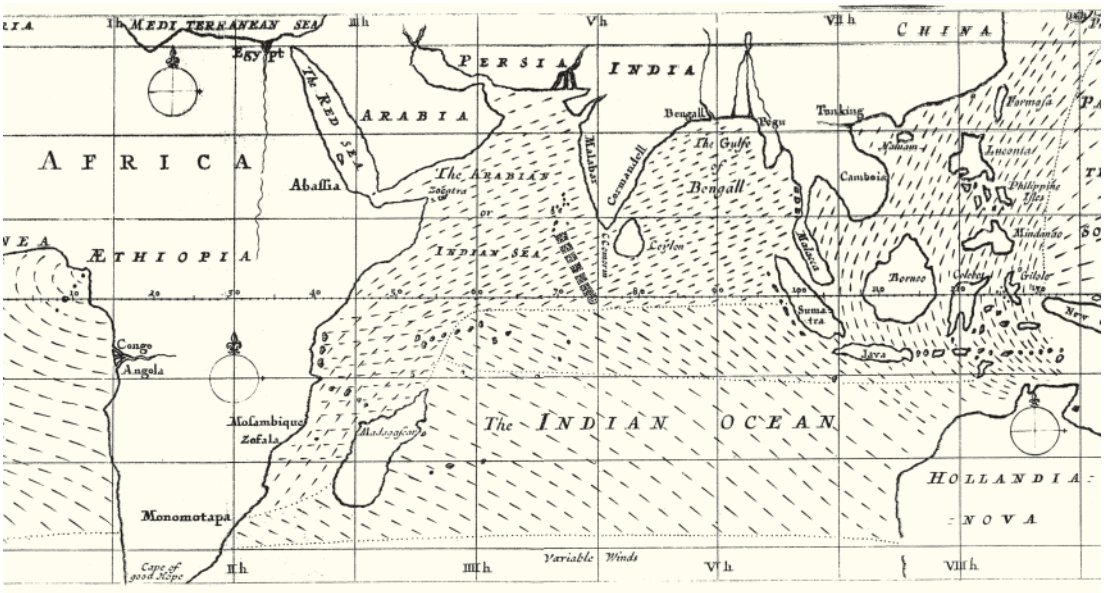
"My worthy Ned," I answered, "to the poet, a pearl is a tear of the sea; to the Orientals, it is a drop of dew solidified; to the ladies, it is a jewel of an oblong shape, of a brilliancy of mother-of-pearl substance, which they wear on their fingers, their necks, or their ears; for the chemist it is a mixture of phosphate and carbonate of lime, with a little gelatine; and lastly, for naturalists, it is simply a morbid secretion of the organ that produces the mother-of-pearl amongst certain bivalves" (Jules Verne, 1873, *Twenty thousand leagues under the sea*).

In all of antiquity, weight for weight, there have been few objects surpassing pearls in value. According to the historian Suetonius, the Roman general Vitellius financed an entire military campaign by selling one of his mother's pearl earrings. Cleopatra, the fable goes, sought to impress her extraordinary wealth on Mark Anthony by gulping down a pearl crushed in wine. The great value of pearls is extolled also in Qu'ran: "God will admit those who attain to faith and do righteous deeds into gardens through which running waters flow, wherein they will be adorned with bracelets of gold and pearls, and where silk will be their raiment" (*Al-Hajj*, 22: 23). The biblical maxim, "Neither cast ye your pearls before swine" (Matthew, 7: 6), has been a cliché for millennia.

Unlike was the case with cinnamon, pearls did not originate only in Sri Lanka: they were fished from several parts of the ancient world, especially Bahrain, in the Persian Gulf (known to Pliny as the Soides). It was the fishery at Arippu (also spelt Aripo) on the north-east coast of Sri Lanka (Pliny's Taprobane), however, that was reputed to produce pearls that were both large and perfectly spherical, bestowing on them unimaginable value. In his *Natural History* (Book 9, Chapter 54), Pliny referred to Taprobane as being "the most productive of pearls of all parts of the world".

Sri Lankan pearls were valued, of course, not just as items of export, but in the country itself. "According to the Mahawamsa," noted Herdman (1903),

> "pearls figure in the list of native products sent as a present from King Vijáya of Ceylon to his Indian father-in-law in about 540–550 B.C.; and again when, in B.C. 306, King Devanampiyatissa sent an embassy to India, the presents are said to include eight kinds of Ceylon pearls. The King's Hall in the Brazen Palace at Anuradhapura (B.C. 161) is said to have been decorated with native pearls. The



In the days of sail, reliable trade had much to do with meteorological knowledge, especially with regard to the wind, and great minds were employed in trying to determine the nature of the weather along key trade routes, and the causes thereof. Edmund Halley (1656–1742) paved the way for scientific meteorology through his discovery that atmospheric motions were caused by solar heating and that barometric pressure decreased in proportion to altitude. This map (Halley, 1686) indicates the wind patterns in the Indian Ocean, showing how the steady accumulation and cartographic and meteorological data was enabling sea routes to be charted with great accuracy.

> mortar in the ruins of Polonaruwa shows the remains of the pearl-oyster shells which were used in its manufacture—no doubt the refuse of an early fishery."

On his visit in 1291, Marco Polo too, observed the existence of a thriving pearl fishery, as did also the 14th-century traveller, Friar Jordanus, who noted, possibly with not a little exaggeration, that some 8,000 boats were engaged in the fishery.

The best pearl-oyster (*Meleagrina vulgaris*) beds were in the Gulf of Mannar, which during Portuguese and Dutch times was in the domain of the King of Kandy, though controlled militarily by the colonists. The fishery was only possible for about a month each year, when the north-east monsoon gave rise to a lull on the island's western side, resulting in seas sufficiently calm and clear for skin divers to retrieve oysters from rocky 'paars' on the seabed at depths of 10–15 m. Given the brief window of opportunity, and the greed for the priceless commodity involved, tragedies were common.

Not surprisingly then, within two decades of the arrival of the Portuguese, the pearl fishery, until then jealously protected by the island's rulers, came under their control. There is almost no record, however, of the Portuguese having engaged in natural-history exploration in Sri Lanka, whether for medicinal plants or for produce outside the items of ordinary trade. They appear to have seen their role in an altogether commercial light.

With the formation of the VOC in 1602, however, the Dutch appear to have had grander designs. From almost the moment the Dutch explorer Joris van Spilbergen landed at Batticaloa in April, 1602, the Hollanders were obsessed with usurping the Portuguese hegemony over the island, mainly with a view to obtaining control of the lucrative trade in

pearls and cinnamon. Tensions ran high between the King of Kandy (Vimala Dharmasuriya I) and the Portuguese, who controlled the western littoral of Sri Lanka, and just as the latter had (a century earlier) been invited in to resolve a domestic dispute between the King of Kotte and his brother, the Dutch were now welcomed in the hope that they would rid Sri Lanka of the Portuguese.

Between 1640 and 1658 the VOC succeeded in evicting the Portuguese from the island and settled in to enjoy the fruits of its natural produce. Even as they did so, however, the British were eyeing their new acquisition. In 1666, the Royal Society of London published in its Philosophical Transactions a set of 'inquiries' it desired to be made in India and Sri Lanka. Among these was the following:

> "Whether upon the same coast of Coromandel, about Tutucorin, and upon that of Ceylon, at Manar, and Jafanapatan, they fish pearls, as good as those about Ormus? Whether those pearls are the better, the deeper they lie? What is the greatest depth, they are known to have been taken at? And whether it be true, that some of the natives there, can stay under water half an hour, without any Art?"

En passant, two centuries before the burgeoning of the tea industry, the Royal Society also posed leading questions on the manufacture of that beverage: "Whether the best Tea be that, which comes forth at the fust [ridge] of the spring [shoot, sprout], and are the top leaves? In what manner 'tis dried; and whether the too hasty drying thereof hurts it?"

The first Dutch-sponsored pearl fishery of 1666 involved an influx of some 200,000 people and 400 boats to Arippu, an area in which freshwater was notoriously short: 1,500 died of disease. Continual bickering between the Kandyan king and the Dutch administration, the involvement of Moorish traders and interference from the south Indian principalities

Such a Pearl of

Grain.	Crowns.
1	1
2	4
3	9
Carats.	
1	16
1 1/4	25
1 1/2	36
1 3/4	49
2	64
2 1/4	81
2 1/2	100
2 3/4	121
3	144
3 1/4	160
3 1/2	196
3 3/4	225
4	256

Carats.	Crowns.
4 1/4	289
4 1/2	324
4 3/4	361
5	400
5 1/4	441
5 1/2	484
5 3/4	529
6	576
6 1/4	625
6 1/2	675
6 3/4	729
7	784
7 1/4	841
7 1/2	900
7 3/4	960
8	1024

At a time when 4 crowns were equivalent to a gold sovereign, the prices of pearls were as shown in this price list (Chapuzeau, 'Sr.', 1666. An account of a small book in French, entitled 'Histoire des Joyaux: et des Principales Richesses de l'Orient et de l'Occident. *Philosophical Transactions (1665–1778)* [of the Royal Society of London], 2: 429–432).

combined to make it difficult for the fishery to be conducted in most years. Because of smuggling, it was impossible to tax the pearls themselves; instead, the Dutch taxed the boats used in the fishery, policing the Gulf vigilantly to ward off unlicensed fishermen, including the king's own boats (which tried abortively to fish off Chilaw instead).

The pearl fishery was enormously valuable to the Dutch, who soon came to realise, however, that it has both good and bad years. Thus, for example, from 1732–46, 1768–96, 1820–28 and 1837–54, the fishery was a failure (Dall, 1883). On the other hand, the 1881 fishery grossed one million US dollars (approximately $25 million at current value), as a result of which there was sustained interest by successive colonial governments.

The fishery itself, which extended over a north-south strip of sea 15–20 km offshore, approximately from Negombo to Mannar, was in the hands of local people. In some years, as

many as 400 boats carrying 10,000 men would engage in the fishery. Oysters were retrieved from 'paars' at depths ranging from 6–12 m by men who would descend aided by a 20 kg stone. About one in every fifty oysters would yield a pearl, and in a good year, a thousand oysters could provide pearls worth about $2,500 at present-day value.

Ordinary divers remain under water fifty to eighty seconds, rarely much longer", observed Herdman.

> It is related, however, that some have been able to remain for as long as five minutes under the surface; this is probably an exaggeration. They seldom take any precautions against injury except to put a little oiled cotton in the outer ear. The most painful part of the operation is not being obliged to hold the breath, but the sensation of great pressure to which the diver is subjected from the water. This in beginners often forces blood from the vessels out of the mucous surfaces and even ruptures the drum of the ear.
>
> They strip for their work. They have a girdle or a band around the neck to which a basket is attached, into which the shells are put as they are gathered. Into the girdle are stuck one or two spikes of iron wood, about a foot long and an inch in diameter. They are made very sharp at both ends and are for defence against sharks and rays. If a shark approaches, the diver endeavours to thrust

Table 1. Biologists co-opted by W. A. Herdman (1905) to describe the 2,615 identified marine species collected in his exploration of the Gulf of Mannar, including 575 new species and 65 new genera of animals. Two members of his team would later become directors of the Colombo Museum.

Nelson Annandale (1876–1924)	Cirripedia
Gilbert Charles Bourne (1861–1933)	Jousseaumia, solitary corals
Edward Thomas Browne (1866–1937)	Medusae
William Thomas Calman (1871–1952)	Cumacea
George Herbert Carpenter (1865–1939)	Hemiptera, Pantopoda
William John Dakin (1883–1950)	Foraminifera
Arthur Dendy (1865–1925)	Sponges
George Philip Farran (1876–1949)	Opisthobranchia
Ethel Sarel Gepp (née Barton, 1864–1922)	Algae
William Evans Holyle (1855–1926)	Cephalopoda
James Johnstone (1870–1932)	Pisces
Frank Fortesque Laidlaw (1876–1963)	Turbellaria
Paul Mayer (1848–1923)	Amphipoda: Caprellidae
Joseph Pearson (1881–1971)	Macrura
Andrew Scott (1868–1931)	Copepoda, Ostracoda
Sir Arthur Everett Shipley (1861–1927)	Gephyrea, Cestoda, Nematoda
Robert Standen (1854–1925)	Mollusca
Thomas Roscoe Stebbing (1835–1926)	Isopoda
Walter Medley Tattersall (1882–1948)	Leptostraca, Schizopoda, Stomatopoda, Cephalocorda
John Arthur Thomson (1861–1933)	Antipatharia, Alcyonaria
Alfred Osten Walker (1832–1935)	Amphipoda
Arthur Willey (1867–1942)	Polychaeta
Charles Branch Wilson (1861–1941)	Copepoda

> one of the spikes into his open mouth, which in closing upon it transfixes the lips and renders the monster harmless.

Once ashore, the divers were allowed to harvest pearls from a quarter of their day's collection, three-quarters accruing to the government, which auctioned its share. After the pearls were collected, the oyster shells were cleaned of flesh and dried for sale as mother-of-pearl. The flesh, from tens of thousands of oysters each day, would be left to rot on the beach, resulting in an unbearable stench.

From 1746 onwards, the Hollanders found it easier merely to auction a franchise for the fishery, limiting it to 600 men. This mechanism ensured that the fishery would swell Dutch (and later, British) colonial coffers for the next one-and-a-half centuries.

While the Portuguese and the Dutch carefully managed the pearl fishery to maximize its value, British policy was more haphazard. Commenting on the fishery, Samuel White Baker (*q.v.*), for example, whined in his 1855 book, *Eight years' wanderings in Ceylon*,

> While fresh from the subject of government mismanagement, let us turn our eyes in the direction of one of those natural resources of wealth for which Ceylon has ever been renowned—the 'pearl fishery.' This was the goose which laid the golden egg, and Sir W. Horton, when governor of Ceylon, was the man who killed the goose. Here was another fatal instance of the effects of a five years' term of governorship. It was the last year of his term, and he wished to prove to the Colonial Office that 'his talent' had not been laid up in a napkin, but that he had left the colony with an excess of income over expenditure. To obtain this income he fished up all the oysters, ruined the fishery in consequence; and from that day to the present time it has been unproductive. This is a serious loss of income to the colony, and great doubts are entertained as to the probability, of the oyster-banks ever recovering their fertility.

In the whole of the 19th century there were only 36 years in which a fishery was conducted, from which the government profited to the tune of rather more than £ 1 million (an enormous sum at the time). The British were thus anxious to ascertain the causes of fluctuation of the oyster population and to know how the harvest of pearls might be increased: it was partly to this end that W. A. Herdman (*q.v.*) was appointed to study the fishery and make recommendations to the government on its management.

Herdman's was the most comprehensive marine biological investigation that had been conducted in South Asia up to that time. The results of his explorations were published, by the Royal Society, in five volumes totalling some 1,500 pages (these represented only the scientific results: the fisheries-management recommendations were published separately, by the Government of Ceylon). In all, 2,615 marine species were described, including 575 new species and 65 new genera (including 11, 20 and 12 new genera and 77, 65 and 80 new species of sponges, platyelmians and copepods, respectively).

Herdman (1906) estimated that a further 1,500 species were recorded from Sri Lanka for the first time, some 900 of these being new also to the Indian Ocean. To achieve this feat, Herdman recruited the assistance of a number of fellow biologists, all of whom he persuaded to work rapidly: all five volumes were published in 1903–06. Apart from Herdman and Hornell, the authors included those listed in Table 1, from amongst whom two, Arthur Willey and Joseph Pearson, would later become directors of the Colombo Museum.

By the early 20th century however, the resource was largely depleted through over-fishing. The numbers of oysters harvested were enormous: in the 1905 season (which also spelt the end of the fishery), for example, Herdman (1905) estimated that almost 82 million animals were brought ashore.

The demise of Sri Lanka's pearl fishery, however, was not brought about only by an unsustainable fishery. By the early 20th century pearls were being cultured in Japan and the United States, a process that would eventually take the bottom out of the market for wild-collected material. An industry that had been celebrated in rhyme and legend for millennia thus came to an end (Pieris, 1918; Boomgaard, 1998). So famous had the pearl fishery become by then that Arippu had been celebrated as the setting even for an opera, *Le pecheurs de perles* ("The Pearl Fishers"), by the French composer Georges Bizet (1838–1875), better known for his *Carmen*.

If spices and medicinal herbs helped lure botanists to Sri Lanka's shores, it ought to have been the pearl fishery that attracted the zoologists. While this was never really so, official interest in pearls did contribute to the colonial government sponsoring some important zoological research and exploration. It was not an accident that the directors of the Colombo Museum were, from its inception in 1877 to the retirement of P. E. P. Deraniyagala in 1963, marine biologists by training.

Additionally, the museum was also for several decades the *de facto* Department of Fisheries, resulting in the remarkably productive Fisheries Research Station, succeeded eventually by the National Aquatic Resources Research and Development Agency which, however, has made but a modest contribution to the objects celebrated in its grandiose appellation.

The pearl fishery did, however, have a direct influence on the careers of many important natural historians including J. G. Loten, E. F. Kelaart and G. M. R. Henry. It also served to attract to Sri Lanka several other competent naturalists, such as W. A. Herdman, whose marine collections would be worked on by others (e.g., Laurie, in Herdman, 1906). When in 1906 the British administration formally yielded a franchise on the fishery to Pearl Fishers Limited, a company specially established for that purpose, an express condition was that the company secured the services of competent marine biologists to conserve the fishery. They were, however, too late and the company was soon bankrupt (Henry, 2000).

Table 2. By 1840 Sri Lanka was producing about 18,000 MT of coffee per annum, representing about nine percent of world production. The island was the third largest producer of coffee at the time, though significantly behind the first two, Brazil (37 percent) and Java (26 percent) (Capper, 1840; Crawford, 1852).

	1833	1834	1835	1836	1837
	£	£	£	£	£
Imports					
Opium	2,205	1,394	1,315	1,360	1,580
Tea	1,463	1,673	1,471	1,286	1,835
Exports					
Coffee	26,020	38,637	59,047	150,642	106,999
Cinnamon	8,272	35,559	22,664	58,494	49,263
Pearls	32,059	–	40,346	25,816	16,087

The plantation raj

For more than a century after they took control of Sri Lanka in 1658, the Dutch harvested only wild cinnamon. With a strictly enforced export monopoly, they ensured that world consumption stayed almost constant at around 400,000 lb (182,000 kg) from 1691 to the end of Dutch rule, in 1696. It was only in 1769 that Governor Imam Wilhelm Falck, weary of continuing difficulties in obtaining permission of the Kandyan king to harvest cinnamon, began in earnest to promote its cultivation both in plantations and home gardens. It was as a result of this initiative that the 'cinnamon gardens' sprang up in and around Colombo. When the British wrested control of the island from the Dutch in 1798, they continued the monopoly, which was eventually yielded only in 1833 when it became clear that free trade could no longer be prevented (Pieris, 1918; Forrest, 1967). By the mid-19th century, competition from the South-east Asian cultivation of *Cinnamomum* species other than the Sri Lankan *C. verum* (which substitutes are often referred to as cassia) and determined efforts by traders to break the monopoly saw prices fall by more than 80 percent. The promise of the spice that had lured one coloniser after another to seek control of Sri Lanka was waning, and though cinnamon continues to be an important Sri Lankan export, it is now a relatively minor one.

The British Governor, Sir Edward Barnes (1776–1838) had, *ca* 1825 begun to experiment with the cultivation of coffee on his property at Gannoruwa, across the Mahaweli River from the Royal Botanic Gardens at Peradeniya. Although coffee (*Coffea arabica*) had been introduced to Sri Lanka by Moorish traders well before the advent of the Portuguese, it had never seriously been cultivated or used as a beverage. In the early 1830s however, interest in coffee began to grow, and the alienation of land in the Central Province for coffee cultivation rose from a mere 337 acres (136 ha) in 1834 to a peak of 78,685 acres (31,844 ha) in 1841 (Forrest, 1967). On the heels of this groundswell of interest came the Irish Potato Famine, sending with it a wave of impoverished youth from Britain, anxious to find prosperity in the colonies.

The coffee industry continued to thrive until 1869, when the first occurrence of Coffee Rust was noted in plantations at Madulsima on the eastern face of the central mountains. This was identified as a hitherto unknown species of fungus, *Hemileia vastatrix* (see p. 73). As the disease spread, coffee planters applied a variety of experimental remedies, all of them unsuccessfully. Declining supply as a result of the blight pushed up prices and desperate planters felled thousands of acres of montane forest in the (futile) hope that coffee grown in previously unplanted land would resist the disease. One of the most tragic consequences of this speculation was the denudation of the whole of the Dimbulla

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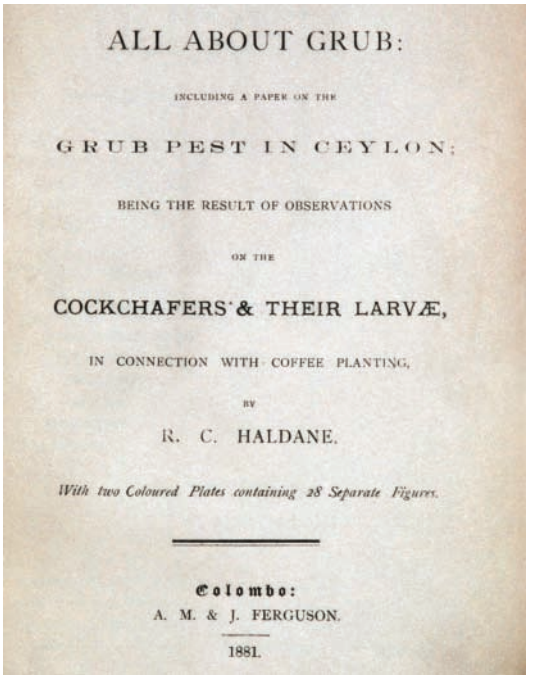
Courtesy of Mr Bruce Henry

and Bogowantalawa Valleys up to an altitude of almost 5,500 ft (1,650 m) (Forrest, 1967). Ironically, even as yields fell in the decade following 1869, the area under coffee increased from 176,000 to 275,000 acres, as coffee planters opened up still more virgin forest in the hope that fresh soil would confer immunity to *Hemileia*. Even so, exports plummeted, from 700,000 bags in 1870 to just 150,000 in 1884. By the end of the 19th century, the industry was dead: the last shipment of coffee left the island in 1899. But for *Hemileia vastatrix*, the British might yet have been a nation of coffee drinkers.

In 1860 G. H. K. Thwaites (see p. 75) had established a nursery at Hakgala (the present-day botanic gardens) for the cultivation of cinchona (*Cinchona* spp., primarily *C. officinalis*; de Silva, 1981), the bark of which tree was processed to obtain the antimalarial drug quinine. Coffee planters were slow to take to the new crop, though experimental plantations were established at Gonamottawa and Loolecondura Estates. By 1868 cinchona bark was being exported to England, and by 1872 Hakgala was overstocked with more than 100,000 plants with no takers. Between 1878


ALL ABOUT GRUB:

INCLUDING A PAPER ON THE

GRUB PEST IN CEYLON;

BEING THE RESULT OF OBSERVATIONS

ON THE

COCKCHAFERS & THEIR LARVÆ,

IN CONNECTION WITH COFFEE PLANTING,

BY

R. C. HALDANE.

With two Coloured Plates containing 28 Separate Figures.

Colombo:
A. M. & J. FERGUSON.
1881.

Growing investment in agriculture, especially coffee and tea, led to a surge in scientific research on pest control and agricultural entomology, including E. E. Green's (1890) *Insect pests of tea*, J. Nietner's (1858) *The coffee tree and its enemies*, and this book by R. C. Haldane.

and 1883 the area under cinchona rose from 6,000 acres to 64,000 acres, with about 3,400 MT of bark being exported in 1883, rising to 6,600 MT by 1886. Then, however, oversupply not just from Sri Lanka but also from India and Java, led to a crash in world prices for the commodity and British planters in Sri Lanka were soon looking to an alternate crop. The time was ripe for tea.

Even as coffee thrived from 1840–1870, tea was already being experimented with. Henry Trimen attempted to record, in his *Administrative Report* for 1886, the beginnings of tea in Sri Lanka:

> This is the proper place to put on record the facts with regard to the first introduction of Assam tea into this Colony. In December, 1839, Dr [Nathaniel] Wallich, the eminent Indian botanist, at that time at the head of the Calcutta Botanic Gardens, sent to

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Opposite page –

Above, land being cleared for tea planting: photograph by John Abercromby Alexander, Sri Lanka, *ca* 1890.

Below, a tea factory under construction on freshly cleared land, *ca* 1880; the planter's bungalow is visible in the distance.

"Spurred to energy partly by the hope of large profits and partly by the romantic adventurous life in the wilderness, a perfect army of coffee-planters invaded the hill forests of Ceylon, and in less than twenty years had, by axe and fire, transformed the larger part of it into profitable plantations. Whole forests were annihilated on the steep slopes by the plan of cutting down the upper ranks of the gigantic trees, and so felling them on to those below, which had been half cut through on the upper side. The enormous weight of these dense masses of vegetation, bound and tied together with creepers, uprooted the trees below, and the whole wood crashed and slipped like an avalanche down into the valley. The mass was then set on fire, and this burnt soil was found excellent for the coffee shrub"— Haeckel, 1883a.

> Peradeniya seeds of the then recently discovered "Indigenous Assam Tea"; and these were followed in February, 1840, by 205 plants. In May, the then Superintendent at Peradeniya, Mr [Harry Thomas] Normansell, sent several plants to Nuwara Eliya, and a man was supplied to look after them. This was after a representation to Government that tea was likely to prove a "new and profitable speculation" and a "valuable source of revenue". Again, in April, 1842, another instalment of Assam plants was received from Dr Wallich, and in October some of these were sent to Mr Mooyart at Nuwara Eliya, with directions for cultivating them.
>
> I had often wondered what became of these, and by accident in London I met the gentleman to whose care they were committed, the Rev. E. F. Gepp, at that time tutor to the son of Sir A[nthony] Oliphant, Chief Justice of Ceylon. He informed me that in October, 1842, he received the plants from Mr Mooyart at Nuwara Eliya, about thirty in number, and cleared a piece of jungle for them on Sir Anthony's land there; they were doing well when he left the island a few years after. Mr Gepp thinks the ground was somewhere in the neighbourhood of the present Queen's Cottage, and it will be well worth a search to discover whether some of the plants may not be still in existence.

While tea planting in Sri Lanka had its beginnings in the 1840s, it was not until both coffee and cinchona failed in the 1880s that it came into its own (Banyard, 1981). In the course of the following century, tea rapidly replaced cinchona and today dominates the landscape of the central hills of the island, isolating all the surviving fragments of montane forest from one another. From just 19 acres in 1867, the area under tea shot up to 384,000 acres by the turn of the century and reached a peak of 594,000 acres in 1965 before beginning a gradual decline to around 470,000 acres at present.

Beginning with G. H. K. Thwaites, successive directors of the Royal Botanic Gardens at Peradeniya pleaded with the government—and lobbied others to plead—to halt the alienation of the highlands for plantation crops. In 1931, even Sir Arthur William Hill, director of Kew, added his voice to the chorus: "This land seems to be washing away into the sea!" The scientists could not, however, prevail against the planters who, by then, could rightly call themselves the mainstay of the island's economy. By 1880, the island's governor, James Longdon (1827–1891), acknowledging that highland forests had been almost entirely decimated, argued that there were no forests left that were worth protecting. " It may without an exaggeration be said", he wrote, "that there are no forests left of such value as to require or justify the creation of an expensive Forest Department."

Ironically, though it was the avarice of planters that resulted in the denudation of Sri Lanka's highlands, many of these same men (e.g., J. Nietner, E. E. Green, F. Wall, J. Pole, T. Farr and W. W. A. Philips) were also the pioneer natural historians and influential members of the early movement for nature conservation. By and large, however, they were blind to the disaster they had precipitated, and continued to cherish such wilderness as remained in Sri Lanka.

It would be an error to conclude, however, that the British in some way had less respect for the environment than native Sri Lankans did. This is not the place for such a discussion, but in these times when so-called traditional wisdom is unquestioningly venerated, the 'politically-incorrect' understatement of Boomgaard (1998) perhaps deserves repetition: "It may seem superfluous even to mention this, but apparently some authors are still convinced that before the arrival of the European maritime powers Asia was largely inhabited by groups of people who practised sustainable forest exploitation." The fact that 60 years after Independence no Sri Lankan government had made even experimental attempts to restore natural forest on even abandoned plantation land, if anything, underlines Boomgaard's assertion.

Exploration of the Flora

Above: The two wings of the National Herbarium in the Royal Botanic Gardens, Peradeniya.
Previous page: *Coelogyne odoratissima*, from the de Alwis collection at the National Herbarium, Peradeniya.

Exploration of the Flora

The Pre-colonial Period

The earliest exploration of Sri Lanka's flora was no doubt by native physicians, who turned to vegetable products for their pharmaceutical needs. The Ayurvedic system of medicine, founded by the Rishis in India well before the advent of Buddhism twenty-five centuries ago, was well established in the island by the time of the Portuguese arrival in the early 16th century (the oldest known indigenous formulary, the *Sarartha Sangrahaya*, had been written eleven centuries previously—Jayaweera, 1981; Roberts, 1931). The *ayurvedic* tradition, however, having developed in India, depended almost entirely on plants native to the subcontinent. Because its practitioners believed that knowledge of the therapeutic properties of plants was divinely inspired, *ayurveda* continued to be practised in Sri Lanka mainly with plants found also in India: few plants endemic to Sri Lanka were added. Nevertheless, with *ca* 70 percent of the island's flowering-plant species being shared also with the mainland, this resource has ensured the survival of Ayurveda in Sri Lanka as an effective competitor to western medicine into the 21st century.

The proximity of north-eastern Sri Lanka to the biodiversity-rich south Indian maritime regions of Malabar, Travancore and Coromandel (which form part of the present-day states of Kerala and Tamil Nadu) would, no doubt, have supported a thriving trade between the two countries from earliest times. Sri Lankan culture, language and religion all derive from Indian roots, and the island's history is punctuated with invasions from the mainland. Long before the Portuguese arrived, Arab seamen were plying a lucrative trade between the 'Western Ghats - Sri Lanka Biodiversity Hotspot' and the Middle East, based on the region's indigenous spices. Cinnamon, and to a lesser extent cardamom (*Elettaria cardamomum*) and black pepper (*Piper nigrum*), native to Sri Lanka and the Western Ghats of India, were already being widely imported to the Mediterranean region in Greek and Roman times (Vaughan and Geissler, 1997; Shaw, 1972). Plants of economic value, including the banana, appear to have made their way to Africa five millennia ago (Lejju *et al.,* 2006), suggesting that exchanges with nearby India were likely well before that.

While Sri Lanka was visited by early explorers including Marco Polo (*ca* 1254–1324) and Ibn Batuta (1304–*ca* 1368), their observations of the island's natural history were at best cursory, and formal biodiversity exploration did not commence until well into the 16th century.

This is not to imply, however, that the island's natives were ignorant of its floral diversity, or the uses of plants. On the contrary, as the earliest documentary records such as Paul Hermann's show, not only were hundreds of plant species identified by name, but in many cases, these names facilitated the systematic arrangement of species into classes, greatly simplifying their assignment to Linnean genera in the 18th century. What is more, the medicinal and other economic uses of plants too, were well understood: e.g., as timber, building materials, food, antiseptic, food-flavouring and dyes.

The Portuguese Period: 1500–1658

With Vasco da Gama opening up the maritime trade route to Europe at the end of the 15th century (1498), the centuries-old Moorish monopoly of south Asia's spice trade ended. In November 1505, a fleet of nine Portuguese naval vessels captained by Don Lourenço de Almeida was blown off course *en route* to the Maldive Islands, and anchored off Colombo. Dharma Parakrama Bahu VIII, the king of Kotte (8 km from Colombo), sent emissaries to greet the visitors, and they were received at court shortly thereafter. Parakrama Bahu, made insecure by threats to his kingdom from within Sri Lanka (over all of which he was not the absolute ruler), was quick to come to an arrangement with the Portuguese—especially in consideration of their artillery—for protection in exchange for 400 *bahars* of cinnamon annually.

By 1521 the Portuguese had control of the western littoral of Sri Lanka and had made significant inroads into the Kandyan hill kingdom. Coincident with Portuguese colonization of Sri Lanka and south India was a renaissance in the study of botany in Europe. Within decades of the maritime routes to Asia and the New World being opened in the early 16th century, plants of economic value were pouring into the apothecaries' gardens of European universities, causing their physicians to begin documenting—and, necessarily classifying—this new-found wealth.

At the same time, advances in printing technology were having an effect arguably more profound than that of the internet today, with access to—and the dissemination of—information becoming far easier than it had been previously. By the early 16th century, botanic gardens were proliferating in Europe and, after a fashion, also in the new colonies. It was also at about this time that the purely utilitarian gardens of medicinal plants started to become centres for aesthetic expression, scientific research and the display of curiosities, the genesis of the elaborately planned and manicured gardens of Europe that followed.

Given the problems associated with keeping exotic plants alive through European winters, students of botany in the sixteenth century also pioneered the *hortus siccus* (literally, the dry-garden)—herbaria of pressed and dried plants maintained for study and reference. Given that such collections, treated with care, have the potential to last for centuries (as indeed many have), the door was opened to the typification of species, fixing their identity to representative 'type' specimens. Writing in 1747, Linnaeus paid homage to his illustrious predecessors of the 17th century, many of whom were associated with botanic gardens or herbaria: "The period around 1671 was the golden age of botany, because there flourished in Europe, at one and the same time and in great numbers botanists, very learned, keen and industrious. Among them were Mentzel, Barreliero, Morison, Munting, Ray, Rudbeck, Boccone, Dodart, Magnol, Breyne, Bromell, Triumfet, Syen, Plumier, Plukenet, Rivinus, and Tournefort. " He was later to honour many of these men with eponymous plant genera.

Although during their time in Sri Lanka the Portuguese failed to institutionalize botanical research, there is no gainsaying their intimate knowledge of, and interest in, things botanical. By the time of their eventual eviction by the Dutch in 1658, they had introduced to not just Sri Lanka but to the world, dozens of important food plants from the Americas, not least the chillie-pepper that was to transform Asian cuisine—and the traffic was by no means only in one direction. No record survives, however, of Portuguese botanical exploration save for the plants they introduced and caused to become naturalized.

An exception to this was Garcia da Orta, a Portuguese of Spanish-Jewish descent, who

arrived in Goa in 1534 as physician to Martim Afonso de Sousa (*ca* 1500–1564), the Portuguese Captain Major of the Indian Ocean and later (1542–1545) governor of Goa. Although da Orta (*ca* 1501–1568[*]) is reputed to have visited Sri Lanka (probably in the company of de Sousa, when he called on King Bhuvanekabahu VII of Kotte in 1538), there is no evidence that he actually botanised or lived in the island for a significant period.

In 1563, da Orta's *Coloquios dos simples e drogas a cousas medicinas da India* ['Colloquies on the simples[**] and drugs of India'], the third book ever printed in India (Markham, 1913) became the first European to attempt to document the medicinal natural history of southwest India and Sri Lanka. Da Orta's impact on the future of the region's botanical literature was significant (Petch, 1916). *Coloquios* described several native remedies and gave a glowing summary of Sri Lanka's virtues: "It is the most fruit-bearing and best island in the world… The woods are full of all the birds in the world… Certainly very good profits might be made of the oranges, for they are the best fruit in the world…There are many palm groves and the elephants are the best in the world…". While some of the remedies da Orta described were derived from the Ayurvedic tradition, many (such as the snakebite cures) were clearly drawn from folklore and fable.

Nevertheless, in the 36 years he lived in Goa, he came to know the medicinal plants of that region intimately, cultivating a great many species in his garden. *Coloquios* contains references, using colloquial names, to some 60 plant, animal and mineral ingredients. Several of the plant names were to serve as roots for binomial scientific names by Linnaeus two centuries hence (although Linnaeus himself made no reference to da Orta, the latter's work would be cited a century hence by van Rheede (*q.v.*), upon whose *Hortus Malabaricus* (1678–1693) Linnaeus drew heavily in the preparation of his own *Species Plantarum* (1753), which was to become the foundation of systematic botany).

Da Orta was followed by the Spaniard Christóbal Acosta (*ca* 1525–1580[§]), who drew largely from *Coloquios* in writing his *Tractado* (1578). This latter work contains descriptions of 69 plants, its principal merit, when compared with the un-illustrated *Coloquios*, being 46 drawings of Indian plants, many of them found also in Sri Lanka.

In writing his 'profoundly indigenous' treatise, da Orta had drawn extensively on the botanical knowledge of the Ayurvedic and Ezhava traditions of southern India, as against the more established Arabic and Brahmin texts (Grove, 1998). The *Coloquios* was translated into Latin by Charles de Lécluse (1526–1609, also d'Ecluse, Latinized as Clusius), resulting in it becoming widely read in Europe. The book was, however, not intended to be a descriptive catalogue of species (as were, in effect, the later works of van Rheede, Hermann, Burman and Linnaeus), but a patently subversive discussion of the "relative merits of entirely different sources of medico-botanical knowledge" (Grove, 1998), seeking to show local, indigenous knowledge to be superior to that acquired from abroad. At a time when received wisdom was treated as sacred, da Orta also extolled the virtues of scientific inquiry, vowing to "continue to search for and inquire about medicines", being clearly critical of the Portuguese' want of scientific curiosity. "The Portuguese," he wrote,

> "who navigate over a greater part of the world only procure a knowledge of how best to dispose of the merchandise of what they bring there and what they shall take back. They are

[*] Markham (1913) has *ca* 1490–*ca* 1570, whereas Desmond (1992) gives *ca* 1501–1568.

[**] Now little used, 'simples' (*n*) as here used means 'ingredient elements'.

[§] Desmond (1992) has *ca* 1525–*ca* 1594 whereas Woodward (1903) gives –1580.

> not desirous of knowing anything about the things in the countries they visit. If they know a product they do not learn from what tree it comes, and if they see it they do not compare it with one of *our* Indian trees [*sic*], nor ask about its fruit or what it is like" (*Coloquios*, 86-7, quoted from Grove, 1998).

The greater significance of the *Coloquios* however, was the parallel it enabled the Dutch physician Jacobus Bontius (Jacob de Bondt, 1592*–1631) to draw between the floras of southwest India and Batavia (the Dutch East Indies) in his *De medicina Indorum* (1642). Thus, "Bontius accidentally brought the natural treasures of the western coast of India within the commercial interests of his masters of the East India Company at Batavia" (Heniger, 1986).

Founded in 1602, The Dutch United East India Company (known by its acronym VOC: Verenigde Oostindische Compangnie) had been incorporated specifically to tap into the rapidly growing commercial links with Asia, with which the maritime route was by then well established. Since the exclusion of the Dutch from Lisbon (then the European centre of trade with Asia) by Phillip II in 1580, these two formidable maritime powers had been at war. In 1602 the Dutch imposed a nutmeg monopoly in the Banda Islands and then went on, in 1605, to declare Amboina a Dutch protectorate. The VOC then proceeded to consolidate its position in Asia by establishing its headquarters in Batavia (Jakarta) in 1619, and it was no secret that the Dutch had set their sights on capturing Ceylon's cardamom trade and the Malabar pepper trade from the Portuguese who, before long, would be left only with tiny settlements in places such as Macao, Goa, Timor and Flores. A century and a half after they arrived in Sri Lanka, the days of Portugal as the island's colonial power were numbered.

* Heniger (1986) has 1592 whereas Woodward (1903) gives 1599.

The Dutch Period: 1658–1796

In mid-1657, a young Hollander by the name of Hendrik Adriaan van Rheede tot Drakenstein (1636–1691) arrived in Batavia. The collapse of Portuguese rule in Sri Lanka, and the occupation of the island by the Dutch East India Company (V.O.C.) had begun. On 5 September 1657 Admiral Rijklof van Goens sailed from Batavia to capture Jaffna, signalling the end of Portuguese rule in Sri Lanka and setting the stage for the takeover of southern India. As a captain in the Dutch navy, van Rheede played an active part in the conquest of Malabar (the south-west Indian littoral, from Goa to Kanyakumari, now largely a part of Kerala), the Dutch army finally defeating the Portuguese at Cochin in early 1663. Van Rheede was appointed to various important administrative posts in Malabar, and paid his first visit to Sri Lanka on 7 October 1665 to report to van Goens, who was now in his third term as the island's governor.

Van Rheede followed this by undertaking a tour of the island, taking note of the "Very dense woods" in the vicinity of Mannar, "in which the game, both boars and deer, live and hide in great numbers, thus causing several lands lying close about them to remain uncultivated… The aforesaid game multiplies so plentifully that the crops in the fields can hardly be preserved, and this multiplication takes place because no inhabitant (as in the days of the Portuguese) is able to kill or catch any game," (Heniger, 1986).

In 1669 the Dutch administration decided to institute two botanic gardens on the island, at Jaffna and Kalutara, for the cultivation of medicinal plants. Thus, the traditional focus of the V.O.C. was widened beyond mere spices. A Dutch doctor, Robert Padbrugge, submitted an initial report on the island's resources to the government, noting the availability of iron, saltpetre, timber and firewood, mentioning also the numerous medicinal and food plants which "easily feed inhabitants roam-

HORTUS
INDICUS
MALABARICUS,

Continens

Regni Malabarici apud Indos celeberrimi omnis generis Plantas rariores,

Latinis, Malabaricis, Arabicis, & Bramanum Characteribus nominibusque expressos,

Unà cum Floribus, Fructibus & seminibus, naturali magnitudine à peritissimis pictoribus delineatas, & ad vivum exhibitas.

Addita insuper accuratâ earundem descriptione, quî colores, odores, sapores, facultates, & præcipua in Medicinâ vires exactissimè demonstrantur.

ADORNATUS

PER

HENRICUM van RHEEDE, van DRAAKENSTEIN,

Nuperrimè Malabarici Regni Gubernatorem, nunc supremi Consessus apud Indos Belgas Senatorem Extraordinarium, & primum successorem loco ordinario destinatum,

ET

JOHANNEM CASEARIUM, Ecclesiast. in Cochin.

Notis adauxit, & Commentariis illustravit

ARNOLDUS SYEN, Medicinæ & Botanices in Academia Lugduno-Batava Professor.

NON ASTAS EST LATA DIU, COMPONI TE NIDOS.

AMSTELODAMI,

Sumptibus JOANNIS van SOMEREN, ET JOANNIS van DYCK.

Anno clɔ Iɔc Lxxviii.

Frontispiece (*left*) and title page (*right*) of van Rheede's *Hortus Malabaricus*.

ing in the forest and keep them in good health… in case of illness there are so many resources that one could produce not only a whole list of the familiar, but moreover a whole book of the unfamiliar ones" (Heniger, 1986).

With this encouraging report in hand, towards the end of 1671 the V.O.C. appointed Paul Hermann (1646–1695), a German physician born in Halle, as chief medical officer to the Company's officers in Sri Lanka. In addition to his medical duties, Hermann was also charged with exploration of the (medicinal) flora of Sri Lanka. Hermann would live and botanise in Sri Lanka for at least the next seven years, for part of which time he was accompanied by Hermann Nikolaus Grimm (sometimes spelt Grim, 1641–1711), a Swedish physician who arrived in India in 1666, at the time serving the Dutch in Sri Lanka. Later, while working for the V.O.C. in Batavia, Grimm (1677) published his *Laboratorium Chymicum*, a booklet surveying the native medicaments of Sri Lanka, prepared from animal, vegetable and mineral ingredients, putatively based on his visit to the island in 1674. Later the same year, Grimm petitioned the Lords XVII of the V.O.C. "to consent to the foundation in Ceylon of a general laboratory for the whole of India, since [I] can testify that I have never beheld any more suitable place for this on the face of the earth" (Heniger, 1986). This task was largely delegated to Hermann, who laid the foundation for future botanical researches in the island (Florijn, 1987).

Grimm is also credited with authorship of *Insulae Zeylaniae Thesaurus Medicus val Laboratorium Ceylonicum*, a 167-page volume published under the name of Bartholmeo Pielat in Amsterdam in 1679. Grimm appears to have derived his botanical knowledge (imperfectly) from Hermann, and his books were not backed by herbaria of preserved specimens, as Hermann's were. Nevertheless, he is credited with the first account of the pitcher plant, *Nepenthes distillatoria*, of which he made careful observations while in Sri Lanka.

For his part, van Rheede undertook a botanical survey of Malabar. Lacking the time and expertise to do this himself, he commissioned an Italian missionary working in Cochin, Father Matthew of St Joseph (*ca* 1617–1691) to begin work on a flora. In 1674 Paul Hermann visited van Rheede in Cochin and was quick to reject Matthew's work for its lack of scientific accuracy. On Hermann's advice, van Rheede commissioned native collectors and artists to prepare a herbarium, together with drawings and notes, of as many plant species as possible. Hundreds of drawings were sent back to Holland, where Arnold Syen (1640–1678), professor of medicine and botany at Leiden, saw to their publication.

Van Rheede's *Hortus Malabaricus* was published in 12 volumes in the period 1678–1693, and contained some 1,600 pages and 790 plates depicting 729 species. The descriptions of Malabar plants in *Hortus Malabaricus* were to become the basis for dozens of scientific names provided by Linnaeus in his *Species Plantarum* (1753), the first work in which Latin binomial nomenclature was consistently applied. Given the close affinity of the floras of Malabar and Sri Lanka, the *Hortus Malabaricus* became the starting point also for the descriptive treatment of the Sri Lankan flora. Before publication of his *magnum opus* was complete, however, van Rheede died, on 15 December 1691, on board the *Drogterland,* off the coast of Mumbai.

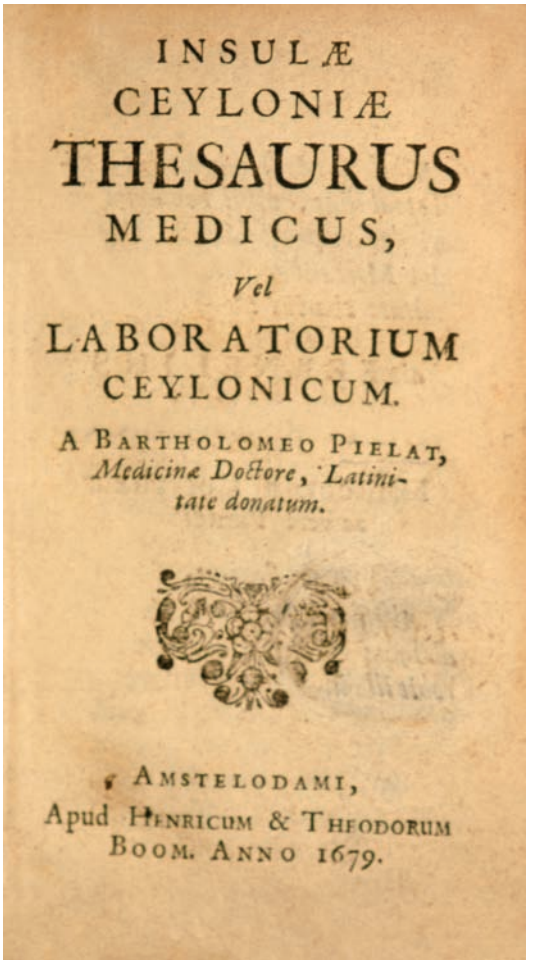
As pointed out by Grove (1998), however, it is important to appreciate the degree to which *Hortus Malabaricus* drew on the indigenous knowledge of the Ezhava community of Kerala, noted for their role as traditional physicians. "Van Rheede's father had been a Chief Forester and the emotional and aesthetic impact of the Malabar forest environment played a vital role, according to van Rheede himself, in encouraging him to embark on a project on the enormous scale of *Hortus Malabaricus*... the commercial and medical potential role of the *Hortus* was almost entirely subordinate to the aesthetic when it came to motivation."

It was not without good cause that van Rheede used the term *Hortus* (Latin, garden), for he perceived in the wilderness of Kerala and [south-western] Sri Lanka, the orderliness of an elaborate garden:

> "Every land and field extending into the plains abounded so much with plants and trees of every kind (as I have said of the above forests), and radiated such fertility, that indeed every piece seemed to have been cultivated by the careful hand of some gardener and planted in a very elegant order. Indeed even the pools, and one may wonder about this, the marshes, nay the very borders of the rivers which carried salt water displayed several plants with which they were almost completely covered. There was no place, not even the smallest, which did not display some plants... This had led me to believe that this part of India was truly and rightly the most fertile part of the whole world and that it was largely similar to the island of Taprobana (which is nowadays called Ceylon), especially to that part which is situated in the same climate as the Malabar region."

Van Rheede made no secret of the fact that the work of *Hortus Malabaricus* was done principally by native experts. Collectors gathered "plants with the leaves, flowers and fruit" and brought them to van Rheede, who super-

Flowers and fruits of the fishtail palm, *Caryota urens,* from van Rheede's *Hortus Malabaricus*. Sap from the inflorescence of this widely-cultivated species is commonly used in southern India and Sri Lanka for producing treacle, palm sugar ('jaggery') and toddy.


INSULÆ
CEYLONIÆ
THESAURUS
MEDICUS,
Vel
LABORATORIUM
CEYLONICUM.
A BARTHOLOMEO PIELAT,
Medicinæ Doctore, Latinitate donatum.
AMSTELODAMI,
Apud HENRICUM & THEODORUM
BOOM. ANNO 1679.

Title page of Nikolaus Grimm's *Insulae Ceyloniae Thesaurus Medicus*, plagiarized by Barthomeo Pielat in 1679. (In this context, 'thesaurus' means 'a treasury'.)

vised "three or four painters, who stayed with me in a convenient place [and] at once accurately depicted the living plants... To these pictures a description was added nearly always in my presence." Chief among his native Ezhava assistants—traditionally palm-toddy tappers and Ayurvedic physicians—was Itti Achuden, an expert ethnobotanist.

Meanwhile, Philippus Baldeus, a Calvinist minister who served as chaplain to troops under the command of the expedition mounted in 1658 by the Dutch general Rijkloff van Goens' (1619–1682) against the Portuguese possessions in southern India and northern Sri Lanka, went on to settle in Jaffna for seven years, proselytizing the natives. After returning to Amsterdam, Baldeus published his 1672 *Naauwkeurige Beschryvinge van Malabar en Choromandel, Der Zelver aangrenzende Ryken, En het machtige Eyland Ceylon...* [A True and Exact Description of the Most Celebrated East India Coasts of Malabar and Choromandel; also the Great Island of Ceylon and the Religion of the Heathens of the East Indies], in which he marvelled at the island's herbal pharmacopoeia: "Ceylon is sufficiently provided with medicinal herbs, and they cure all the distempers with green herbs, in the use whereof their physicians are better versed (by experience) than many of our pretending chyrurgeons"(Peiris, 1952).

Baldeus was a keen observer, and documented a wealth of information that was new to Europe. For example, on a visit to the Gulf of Mannar to observe the pearl fishery, he was fascinated by the dugongs: "a kind of sea-calf, which is amphibious, and yields meat, not only far exceeding that of sturgeon, but also tasting like veal; and the females of them have milk in their dugs." He also observed that Sri Lanka was "subject to monsoons, where the winds blew from the north [-east] during one season, and from the south [-west] during the other". Further, at "Paletiva, one of the small isles near Jafnapatnam, the people catch wild horses by chasing them into a water-pool and so mastering them with nooses". Of relevance to his European readership also were the commercial products of Sri Lanka: "stained stuffs, silks, porcelain, spices, camphire, abmer-gris and santal[-wood]"; and not least the gems: "rubies, saphirs, topasses, granatas". Of such interest was the region to the British that, hot off the press, Baldeus's book was reviewed and summarised in none less than the *Philosophical Transactions of the Royal Society* (Anon., 1671).

The new interest in South Asian botany, meanwhile, was manifesting itself also in the fast-growing botanic garden and herbarium at Leiden University, which was being supplied by Hermann and other anonymous donors from Sri Lanka (Heniger, 1986). When the first volume of *Hortus Malabaricus* reached Governor-General van Goens in 1679, he clearly wanted his dominion of Sri Lanka to outshine Malabar. "With medicaments our people in Ceylon will not only be able to provide ourselves", he noted,

> "but also in due time provide us with them plentifully… Great diligence in this respect is displayed by the doctor and herbalist Hermansz [*sic*], who (as reported to us) has already described in Ceylon more than 10,000 unusual plants, shrubs and herbs, among them a great many which have never been known to any authors [1,000 species at most are in fact contained in Hermann's herbaria —Heniger, 1986]. The island of Ceylon is so blessed a land of all sorts of valuable and splendid medicines as any land on earth can be, all this so plentifully that before long only very few medicaments need be sent from the home country. The book you have sent us, called Hortus Malabaricus, does not contain anything that is unknown and plentifully to be obtained in Ceylon, so that one need not go to Malabar for this at all. Those who know both sustain that the herbs and medicines in Ceylon are as much more potent as Ceylon cinnamon exceeds wild Malabar cinnamon."

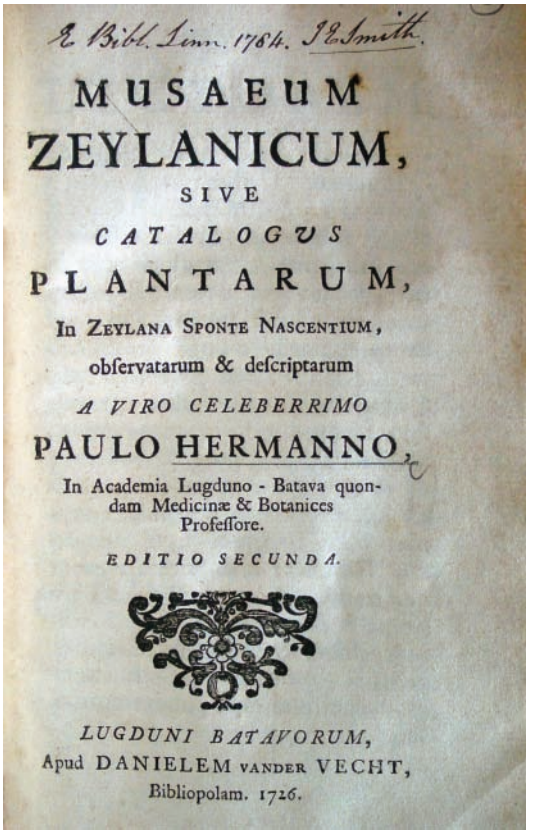
Meanwhile, botanising in between serving as a physician in and around Colombo between 1672 and 1679, Hermann accumulated a sizeable herbarium and made copious notes and drawings of Sri Lankan plants (Lourteig, 1966; Rauschert, 1970; Rice, 1999). It is interesting to note that at the time of Hermann's sojourn in Colombo, the interior of Sri Lanka was still in the hands of the Kandyan king: in fact, Robert Knox was a prisoner of the king at this very time.

Courtesy of the Natural History Museum, London

Drawing of the fruits of the fishtail palm, *Caryota urens*, in the Hermann Herbarium at the Botany Department of The Natural History Museum, London.

Courtesy of the Natural History Museum, London

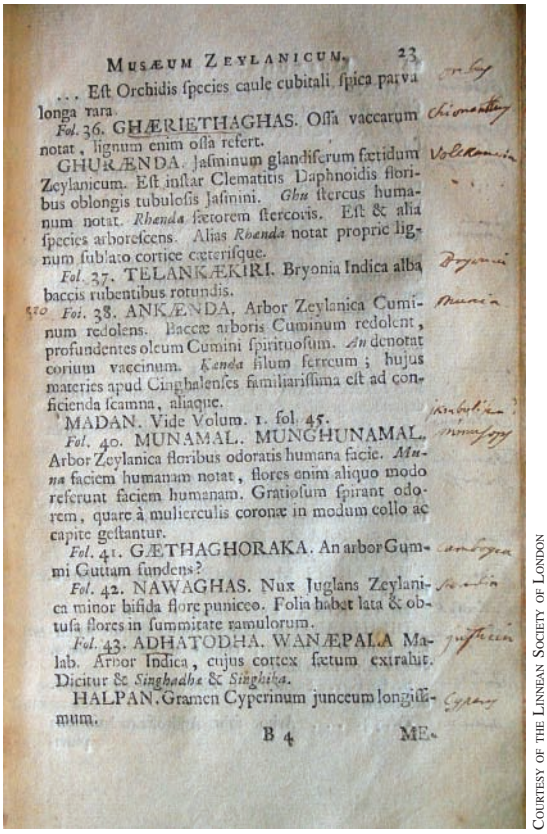
Specimen of *Mesua ferrea*, the 'ironwood tree', in the Hermann Herbarium at the Botany Department of The Natural History Museum, London.



E Bibl. Linn. 1784. J.E. Smith.

MUSAEUM
ZEYLANICUM,
SIVE
CATALOGUS
PLANTARUM,
In Zeylana Sponte Nascentium,
observatarum & descriptarum
A VIRO CELEBERRIMO
PAULO HERMANNO,
In Academia Lugduno - Batava quondam Medicinæ & Botanices Professore.
EDITIO SECUNDA.

LUGDUNI BATAVORUM,
Apud DANIELEM VANDER VECHT,
Bibliopolam. 1726.



MUSÆUM ZEYLANICUM. 23

... Est Orchidis species caule cubitali, spica parva longa rara.

Fol. 36. GHÆRIETHAGHAS. Ossa vaccarum notat, lignum enim ossa refert.

GHURÆNDA. Jasminum glandiferum fœtidum Zeylanicum. Est instar Clematitis Daphnoidis floribus oblongis tubulosis Jasmini. *Ghu* stercus humanum notat. *Rhenda* fœtorem stercoris. Est & alia species arborescens. Alias *Rhenda* notat propric lignum subtalco cortice cæterisque.

Fol. 37. TELANKÆKIRI. Bryonia Indica alba baccis rubentibus rotundis.

Fol. 38. ANKÆNDA. Arbor Zeylanica Cuminum redolens. Baccæ arboris Cuminum redolent, profundentes oleum Cumini spirituosum. *An* denotat corium vaccinum. *Kenda* filum ferreum; hujus materies apud Cinghalenses familiarissima est ad confidenda scamna, aliaque.

MADAN. Vide Volum. I. fol. 45.

Fol. 40. MUNAMAL. MUNGHUNAMAL. Arbor Zeylanica floribus odoratis humana facie. *Muna* faciem humanam notat, flores enim aliquo modo referunt faciem humanam. Gratiosum spirant odorem, quare à mulierculis coronæ in modum collo ac capite gestantur.

Fol. 41. GÆTHAGHORAKA. An arbor Gummi Guttam fundens?

Fol. 42. NAWAGHAS. Nux Juglans Zeylanica minor bifida flore puniceo. Folia habet lata & obtusa flores in summitate ramulorum.

Fol. 43. ADHATODHA. WANÆPALA Malab. Arbor Indica, cujus cortex fœtum extrahit. Dicitur & *Singhadha* & *Singhika*.

HALPAN. Gramen Cyperinum junceum longissimum.

B 4 ME-

Courtesy of the Linnean Society of London

Courtesy of the Linnean Society of London

Title page and page 23 of Carolus Linnaeus's own copy of Paul Hermann's 1726 *Musaeum Zeylanicum*, the founder-work of Sri Lankan botany. Hermann recorded the local names for almost all the plants he collected in Sri Lanka, often writing these in Sinhala (a language he learned while in the island) on his herbarium sheets. On the right margin are the manuscript annotations by Linnaeus, of the genera to which he assigned these species.

While in Sri Lanka Hermann learned Sinhala, and his notes in the library of the Natural History Museum, London, contained also 11 leaves of a manuscript titled *Vocabularium Selanense seu Ceylon in India Orientali* sent to the Rev. Thomas Hyde (1636–1703), then Keeper of the Bodleian at Oxford, which included a Sinhala alphabet, a 120-word glossary of anatomical and medical terms, a description of the nobility, and an account of indigenous religious and cultural practices (Peiris, 1952). His alphabet is among the earliest surviving examples of the Sinhala script. Sadly, this manuscript appears to be lost or misplaced: in February, 2007, a search for it in The Natural History Museum's Botany Library proved abortive (it is nowhere catalogued in the museum's collections).

Hermann's seminal contribution to botany however, was his herbarium, which included around 1,000 species of plants (these were determined and catalogued in their entirety by Trimen, 1887). The collection also included more than a dozen American species such as custard apple, guava, cashew nut and capsicum, an indication of how rapidly plants of commercial value became established outside the New World (Mehra, 1965). Sadly, it seems Hermann never ventured far from Colombo, and certainly not deep into the forested parts of Sri Lanka (it was probably unsafe to do so because of tensions between

the Dutch regime in the coastal provinces and the Kandyan Kingdom in the interior): his plants are typical of coastal home gardens in the western part of the island.

Herman returned to Leiden in 1679, to take the place of Syen, who had died the previous year, as Professor of Botany. He was only 33 years old at the time. He took with him from Sri Lanka also a cabinet of zoological specimens preserved in alcohol, which was exhibited at his residence adjoining the botanic garden at Leiden (this was sold by his widow in 1711, after which it was lost). Hermann himself died of pneumonia in January, 1695, and in the preceding 15 years probably wrote the manuscripts upon which William Sherard (27 February, 1658/9–11 August, 1728) of Oxford University, who was Hermann's student at Leiden in 1688–1689, based *Paradisus Batavus* (1698) and *Musaeum Zeylanicum* (1717, reprinted in 1726), both of which were probably edited by Sherard and published posthumously in Hermann's name (the latter included the Sinhala names of the plants listed). The former work includes descriptions of several Sri Lankan plants while the latter is a catalogue of Hermann's herbarium, which was fragmented and misplaced by the time of his death.

Hermann himself published little on Sri Lanka, apart from his (1687) *Horti Academici Lugduno-Batavi catalogus exhibens plantarum omnium nomina, quibus ab anno MDCLXXXI ad annum MDCLXXXVI Hortus fuit instructus...* Illustrated with 107 engraved plates, the book catalogued the *ca* 1,500 species of plants from Sri Lanka and the African cape then in the Leiden botanic garden (which contained, however, an estimated total of 3,800 taxa at the time).

On Hermann's death, Sherard was not long in sending John Hartog, a native of Leyden and trained at the botanic garden there, to retrace Hermann's footsteps and augment his collections. Hartog made extensive collections in the Cape and then proceeded to Sri Lanka, from where he sent to Voss (curator of the botanic garden at Amsterdam) the herbarium on which the Dutch botanist Johannes Burman (1706–1779) would, in 1737, in part base his *Thesaurus Zeylanicus.* While in Sri Lanka, Hermann had also sent "Complete Ceylon herbaria" to Johann Commelin (1629–1692), superintendent of the botanic garden at Amsterdam, and it was primarily upon this that Burman based his *Thesaurus* (Trimen, 1887; see also van Ooststroom, 1937 and Rauschert, 1970).

Jan Maurits Quinkhard's (1668–1772) drawing of Johannes Burman, engraved by Jacobus Houbraken (1698–1780) for the frontispiece of *Thesaurus Zeylanicus.*

At that point Hartog, who had only narrowly missed being devoured by a lion while collecting in South Africa, disappears from the record. Also botanising in Sri Lanka at about the same time was Engelbrecht Kaemp-


E Bibl. Linn. 1784. J.E. Smith.

THESAURUS
ZEYLANICUS,

exhibens
PLANTAS IN INSULA ZEYLANA NASCENTES;
Inter quas
Plurimae novae ſpecies, & genera inveniuntur.
Omnia Iconibus illuſtrata, ac deſcripta
CURA & STUDIO
JOANNIS BURMANNI,
Med. Doct. & Botanices Profeſſoris in Horto Medico Amſtelaedamenſi.

AMSTELAEDAMI,
Apud { JANSSONIO-WAESBERGIOS, & SALOMONEM SCHOUTEN.
MDCCXXXVII

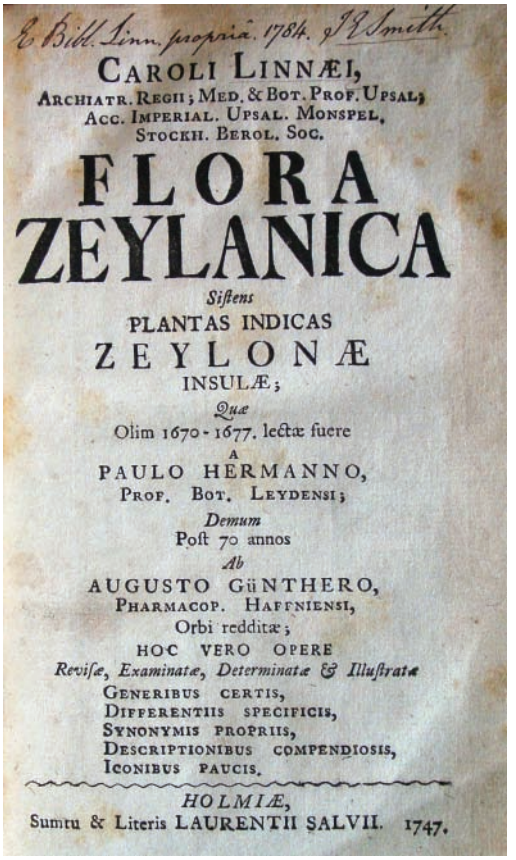
Title page of Carolus Linnaeus's own copy of Johannes Burman's 1737 *Thesaurus Zeylanicus,* drawn and engraved by Adolf van der Laan (*fl.* 1690–1755).

fer (1651–1719), a German traveller and naturalist who lived for two years in Japan. In addition to a manuscript *History of Japan* (published posthumously), Kaempfer also wrote *Amoenitates Exoticae* (1712).

In *Thesaurus Zeylanicus*, Burman presented descriptions, together with 110 drawings, of part of the plants described by Hermann, augmented by Hartog's collection. Burman, a year Linnaeus' senior, was already a recognised botanical authority when the Swede called on him in 1835 while he was engaged in writing the *Thesaurus*. Though at the time only slightly acquainted with Linnaeus, Burman was impressed with the Swede's knowledge of botany (even though this was Linnaeus's first experience of a tropical flora), and invited him to spend the winter in his house and help with the preparation of the book (Blunt, 1971). It was while working on the Sri Lankan flora in Burman's house that Linnaeus first met the enormously wealthy Anglo-Dutch financier and amateur naturalist George Clifford, who was to be an important patron in his career. Hermann's Sri Lankan herbarium thus had effects well beyond the obvious in the history of botany.

Hermann's herbarium (i.e., the one on which he based his *Musaeum Zeylanicum*) had been considered lost after it was auctioned by his widow in 1711. In 1744, Carl Linné (23 May, 1707–10 January, 1778) (now referred to by the Latinized form of his name: Carolus Linnaeus) received from August Günther, the Danish Apothecary-Royal, a parcel containing four herbarium volumes together with an album of some 400 drawings. Günther sent the collection to Linnaeus with a request that he identify the specimens. The volumes contained, in addition to dried Sri Lankan plants, a smattering of pressed insects, and also a handful of South African plants (Karsten, 1967). Linnaeus immediately recognised the four herbarium volumes as those on which Hermann's *Musaeum Zeylanicum* had been based.

The rediscovery of Hermann's herbarium at last offered Linnaeus an opportunity to compile a tropical flora. In 1747 he published *Flora Zeylanica,* which he dedicated to Günther. This, together with *Hortus Malabaricus*, *Musaeum Zeylanicum* and *Thesaurus Zeylanicus* ensured that the Sri Lankan flora was exceedingly well represented in the founderwork of systematic botany, the 1753 edition of Linnaeus's *Species Plantarum.* In *Flora Zeylanica*, Linnaeus described 429 species of plants, which were assigned to genera together with a further 228 he was unable to allocate to a genus (because of the lack of specimens); all 657 species were based on Hermann's material. The book was embellished with just four plates (drawings), but this is no great disadvantage given the existence of the herbarium itself upon which it is based.


E Bibl. Linn. propria. 1784. J E Smith

CAROLI LINNÆI,
ARCHIATR. REGII; MED. & BOT. PROF. UPSAL;
ACC. IMPERIAL. UPSAL. MONSPEL.
STOCKH. BEROL. SOC.

FLORA ZEYLANICA

Sistens
PLANTAS INDICAS
ZEYLONÆ
INSULÆ;
Quæ
Olim 1670-1677. lectæ fuere
A
PAULO HERMANNO,
PROF. BOT. LEYDENSI;
Demum
Post 70 annos
Ab
AUGUSTO GÜNTHERO,
PHARMACOP. HAFFNIENSI,
Orbi redditæ;
HOC VERO OPERE
Reviſæ, Examinatæ, Determinatæ & Illuſtratæ
GENERIBUS CERTIS,
DIFFERENTIIS SPECIFICIS,
SYNONYMIS PROPRIIS,
DESCRIPTIONIBUS COMPENDIOSIS,
ICONIBUS PAUCIS.

HOLMIÆ,
Sumtu & Literis LAURENTII SALVII. 1747.

Title page of Carolus Linnaeus's own copy of *Flora Zeylanica* (1747).

Illustration of *Hedysarum* in Carolus Linnaeus's *Flora Zeylanica* (1747).

Flora Zeylanica distinguished species by the use of descriptive Latin polynomials (Linnaeus did not consistently apply his binomial system of nomenclature until six years later). However, in *Flora Zeylanica*, he numbered every species, and also cross-referenced each to Hermann's specimens and drawings by writing the relevant number next to them, making the relationship between specimens and descriptions explicit. In Linnaeus's (1753) *Species Plantarum*, most Sri Lankan plant names were based on their earlier *Flora Zeylanica* accounts. Hermann's herbarium is therefore very rich in Linnaean type material, and is an important element of botanical systematics not just for Sri Lanka, but Asia in general.

Linnaeus also used Hermann's herbarium to connect Burman's and his own work with *Hortus Malabaricus,* scientifically demonstrating the validity of van Goens' claim of a largely shared flora between Malabar and Sri Lanka. He also added a preface in which he traced the history of Sri Lankan botany until then (especially Hermann's pivotal role in it) and a rough sketch of the island, based largely on Knox's (1681) account. (In his *An historical relation of Ceylon* Knox provided a general account of the island's trees, and Linnaeus named the genus *Knoxia* in his honour.) In 1748 a second edition of *Flora Zeylanica* was published, together with an undated 14-page appendix (*Nova genera plantarum zeylanicarium, nuper edita in diss. acad. sub Praesidio auc-*

COURTESY OF THE LINNEAN SOCIETY OF LONDON

Carolus Linnaeus, a medical doctor and naturalist, who devised and from 1753 consistently applied the binomial system of taxonomic classification still in universal use. This is a copy (by Lorens Pasch the younger) of the 1775 portrait of Linnaeus by Alexander Roslin at Versailles.

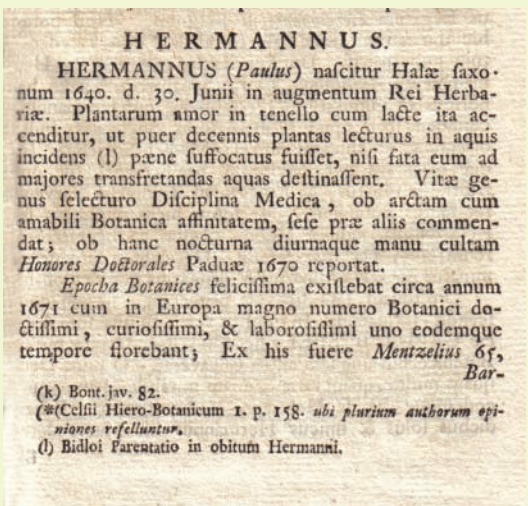
Biographical Note on Paul Herman by Carolus Linnaeus in the Preface to *Flora Zeylanica* (1747)

Translated from the Latin by Edmund Peiris [edited and annotated by R.P.]

(*Journal of the Ceylon Branch of the Royal Asiatic Society*, 1952, 2(1): 1–20, pl. 1)

Hermann, Paul, was born at Halle in Saxony on 30 June 1640, for the advancement of botany (*in augmentum Rei Herbariae*). Love for plants was kindled in him, when yet a suckling, to such an extent that when a lad of 10 years he fell into the water while gathering plants, and would have been drowned, had not the Fates destined him to traverse a greater expanse of water. When the time came for him to choose a profession, he preferred medicine to other studies, because it bore a very close affinity with his beloved subject, botany. On account of this predilection, he worked day and night and obtained the honours of a doctorate in the University of Padua in 1670. The period around 1671 was the golden age of botany, because there flourished in Europe, at one and the same time and in great numbers botanists, very learned, keen and industrious. Among them were* Mentzel, Barreliero, Morison, Munting, Ray, Rudbeck, Boccone, Dodart, Magnol, Breyne, Bromell, Triumfet, Syen, Plumier, Plukenet, Rivinus, and Tournefort. What men they were! And such illustrious names! These, by their united effort and infinite industry, discovered plants more rare and Indian than all their predecessors. But the principal seat of flora was in Belgium, where many noblemen, endowed with learning, enthusiasm, rank and wealth, had entered the very stronghold of botany. Such, for instance, were Benting, Witsens, Fagel, Bewerning, Beaumont, and Commelin. They set up private gardens with large quantities of exotic plants, gathered from everywhere, especially the two Indies, because they wished and were able to risk their resources for this purpose.

It was at this period and under such auspices that the Fates led into Belgium a young man of 30, named Hermann, in the full flush of life, as the ambassador of botany. He could not lie long hidden from Syen, who, at the time, ruled over the repository of flora at Leyden. Hermann was conducted by Syen to Benting, the grand old man of botany (*Florae senatorem*), a person eminent in rank and nobility, who commended Hermann to the governors of the East India Company for service, as medical supervisor of the Company throughout Ceylon, in the well founded hope that if a man so enthusiastic on the subject and so well versed in it went to Ceylon, he would send his benefactors selected seeds, bulbs, roots and plants. And indeed, his hopes were fully realised. Hermann was immediately appointed the Ordinary and First Physician over the island of Ceylon.



HERMANNUS.

HERMANNUS (*Paulus*) naſcitur Halæ ſaxonum 1640. d. 30. Junii in augmentum Rei Herbariæ. Plantarum amor in tenello cum lacte ita accenditur, ut puer decennis plantas lecturus in aquis incidens (l) pæne ſuffocatus fuiſſet, niſi fata eum ad majores transfretandas aquas deſtinaſſent. Vitæ genus ſelecturo Diſciplina Medica, ob arctam cum amabili Botanica affinitatem, ſeſe præ aliis commendat; ob hanc nocturna diurnaque manu cultam *Honores Doctorales* Paduæ 1670 reportat.

Epocha Botanices feliciſſima exiſtebat circa annum 1671 cum in Europa magno numero Botanici doctiſſimi, curioſiſſimi, & laboroſiſſimi uno eodemque tempore florebant; Ex his fuere *Mentzelius* 65, *Bar-*

(k) Bont. jav. §2.
(*)(Celſii Hiero-Botanicum 1. p. 158. *ubi plurium authorum opiniones refelluntur.*
(l) Bidloi Parentatio in obitum Hermanni.

Linnaeus's biographical account of Paul Hermann in *Flora Zeylanica.*

* Christian Mentzel (1622–1701), Jacobo Barreliero (1606–1673), Robert Morison (1620–1683), Abraham Munting (1626–1683), John Ray (1627–1705), Olaf Rudbeck (1660–1740), Paolo Silvio Boccone (1633–1704), Dionys Dodart (1634–1707), Pierre Magnol (1638–1715), Jacob Breyne (1637–1697), Olof Ole Bromell (1639–1705), Giovanni Battista Trionfetti (1658–1708), Arnold Syen (1640–1678), Charles Plumier (1646–1704), Leonard Plukenet (1642–1706), Augustus Quirinus Bachmann Rivinus (1652–1723), Joseph Pitton de Tournefort (1656–1708).

When the fates had thus revealed themselves, Hermann set sail. On this voyage, he touched the Cape of Good Hope, in Africa. This land had never been trodden by any botanist before. And Good Lord! What a number of rare and wonderful plants met his gaze in one day! Within a short time, Hermann, all by himself, discovered here more new African plants than all his predecessors had done, in any part of the world... From the Cape, he dispatched to botanical repositories more new plants than anyone before him; and these are yet the pride of European gardens. The great discoverer thus won himself undying fame.

After he had in this manner increased the stock of flora during his stay in Africa, he continued his voyage to India, where, with Ceylon, a new world subjected itself into his botanical sway. Of all the plants which the learned botanist had seen before in Europe, he found in Ceylon hardly three specimens. In fact, all which he noticed here were new...

While thus spending hours on end collecting plants and drying them, he at the same time inquired into their indigenous names, tested their virtue, attempted to find out causes, with our countryman [Hermann Nikolaus] Grimm [1641–1711], and took care that most of the plants were sketched out very artistically. Thus after making a complete collection of Ceylon plants, he sorted them out into three volumes. In the fourth volume, he put together African plants with the most rare of Ceylon plants. Those which he did not get into the collection, he kept with him. Finally, a fifth volume contained sketched out (Lat. *in forma atlantica*) as the preceding, about 400 drawings of new Ceylon plants done with an artistic hand. He sent to Europe every year seeds of very rare plants and complete collections of the Ceylon Flora to Commelin and others.

When Hermann's merits and praises were on the lips of every research student throughout Europe, Arnold Syen, Professor of Botany in Leyden, passed away in 1678. There was not in this wide world of ours another equal to Hermann in services rendered to botany and in discoveries made. He was, therefore, appointed immediately to the chair of Medicine and Botany in the Leyden University by its trustees. As it took nearly two years for him to return home and assume duties, the trustees appointed in 1679 Peter Hotton [1648–1709], Professor of Botany, until our man could return from India [in fact, Sri Lanka] and present himself at Leyden. Happily this took place in the month of August, 1680.

He set about the task assigned to him without delay. He laid out the walks (*pomeria producit*) of the Botanical Gardens and brought into it twice as many plants as all his predecessors*, Bontius, Clutius, Pavius, Clusius, Vorstius, Schuylius and Syen, had done within a hundred years. Among these, he had many Indian [*sic*] plants which he had brought from Ceylon; they had never been seen before or since, in Europe. He was the first to introduce into Belgium the principle of classification based on fruits, revived recently by Morison. He arranged systematically all the plants in the Botanical Garden, constructed hothouses, corrected the Materia Medica and set up a Museum of his own collections in the Garden. During his holidays, he went to France, Britain and Germany for plants. At the approach of the Prince of Botany, there gushed forth flowing mountains in the Royal Botanical Gardens of Paris, then under the direction of Tournefort. The great world of learning already promised itself Ceylon plants, so greatly desired during many years, but public lectures, private tuition, academic business, consultations with students and the care of the gardens took up all his time, until a fateful attack of pneumonia stifled the illustrious Hermann on the 28 January 1695.

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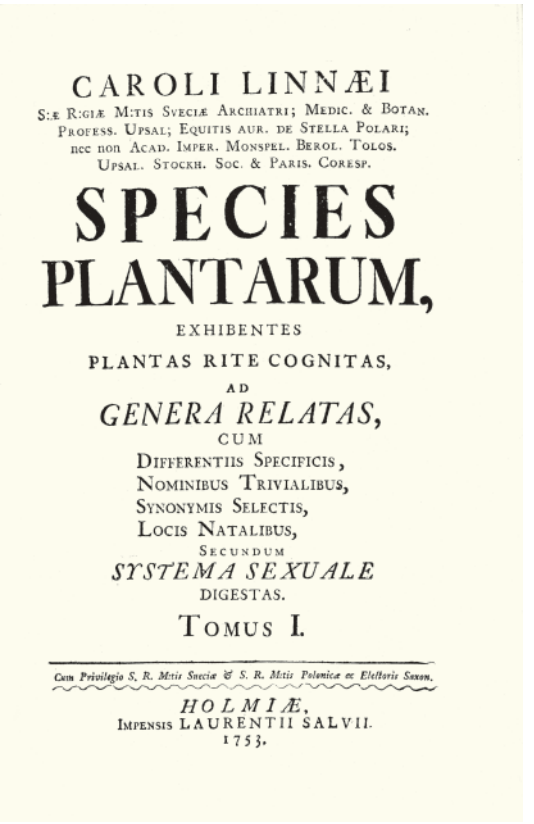
* Jacobus Bontius (1599–1631), Theodorus Clutius (1546-98), Pieter Pavius (1564–1617), Charles de Lécluse (1526–1609), Adolphus Vorstius (1597–1663), Florentius Schuyl (1619–1669) and Arnold Syen (1640–1678),



CAROLI LINNÆI
S:Æ R:GIÆ M:TIS SVECIÆ ARCHIATRI; MEDIC. & BOTAN.
PROFESS. UPSAL; EQUITIS AUR. DE STELLA POLARI;
nec non ACAD. IMPER. MONSPEL. BEROL. TOLOS.
UPSAL. STOCKH. SOC. & PARIS. CORESP.

SPECIES
PLANTARUM,

EXHIBENTES
PLANTAS RITE COGNITAS,
AD
GENERA RELATAS,
CUM
DIFFERENTIIS SPECIFICIS,
NOMINIBUS TRIVIALIBUS,
SYNONYMIS SELECTIS,
LOCIS NATALIBUS,
SECUNDUM
SYSTEMA SEXUALE
DIGESTAS.

TOMUS I.

Cum Privilegio S. R. Mtis Sueciæ & S. R. Mtis Poloniæ ac Electoris Saxon.

HOLMIÆ,
IMPENSIS LAURENTII SALVII.
1753.

Title page of Linnaeus's epoch-making 1753 *Species Plantarum,* the starting point of botanical taxonomy, because it was here that Linnaeus began consistently to use binomial names comprising a generic name coupled with a specific epithet.

toris per Carolus Magnus Dassaw Heic compendiose proposita, originally issued as a separate) 'edited' by Carl Magnus Dassaw (1719–1751). Forty-three new genera of Sri Lankan plants were listed and described in this, all of which were later incorporated into the fifth edition of Linnaeus's *Genera Plantarum* (1754).

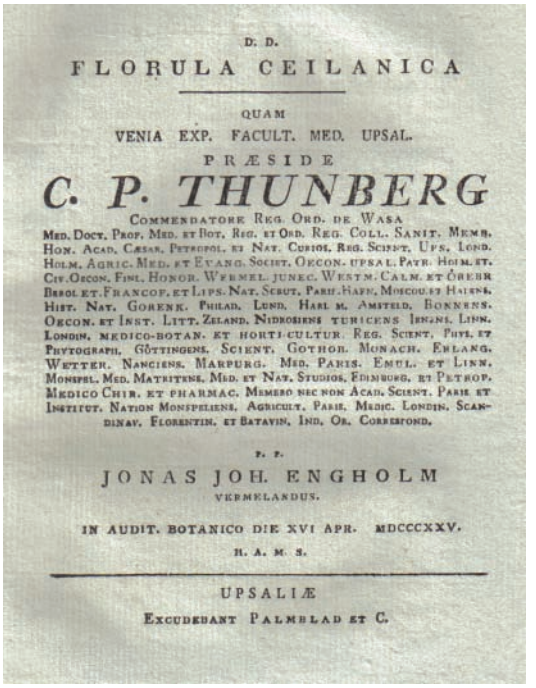
Linnaeus eventually returned the volumes of Hermann's herbarium to Günther, from whom they passed to the Danish Count Adam Gottlob Moltke. After the latter's death, they were bought by a Professor Treschow of Copenhagen, from whom they were purchased by Sir Joseph Banks (1743–1820) in 1793 for £75. In 1827 the volumes finally reached the British Museum (now The Natural History Museum) with the rest of the Banks collections. The National Herbarium of the Netherlands contains the other collection of Hermann's Sri Lankan material (van Oostroom, 1937).

In addition to Hermann's, Linnaeus also had access to other botanical collections made from Sri Lanka by itinerant Europeans such as Laurent Garcin (1683–1752), a botanist and physician from Grenoble, who having studied medicine in Holland served as surgeon on board vessels of the French Compagnie des Indes Orientales on three voyages to the East Indies. He visited Sri Lanka at least twice, in 1722 and 1727, where he collected plants. In later life, Garcin settled in Neuchâtel, from where he published several essays on natural history in *Journal helvétique* (1735–1748). Linnaeus would later name the genus *Garcinia* (to which several important fruits, including the mangosteen and the gamboge, belong) in his honour.

In the second half of the 18th century however, the pace of botanical exploration slowed down. With the ascendancy of the British East India Company, Dutch influence in the subcontinent was waning, and the early promise of miracle drugs lurking among the island's flora had proved false.

Botanical visitors to Sri Lanka during the period included, in 1777, 1780 and 1781 Linnaeus' pupil Johan Gerhard Kønig (*q.v.*, 1728–26 June, 1785), who botanised extensively India and the East Indies between 1768 and 1785 (see Kønig, 1773, 1779a,b). His collections were bequeathed to Banks, who accompanied James Cook in his circumnavigation of the globe (1768–1771). Banks was president of the Royal Society from 1778 until his death in 1820, and used the influence of his position to develop Kew Gardens as the leading botanical institution of the British Empire.

At about the same time, Johan Peter Rottler (1749–1836), a Danish missionary (born,



D. D.

FLORULA CEILANICA

QUAM

VENIA EXP. FACULT. MED. UPSAL.

PRÆSIDE

C. P. THUNBERG

COMMENDATORE REG. ORD. DE WASA

MED. DOCT. PROF. MED. ET BOT. REG. ET ORD. REG. COLL. SANIT. MEMB. HON. ACAD. CÆSAR. PETROPOL. ET NAT. CURIOS. REG. SCIENT. UPS. LOND. HOLM. AGRIC. MED. ET EVANG. SOCIET. OECON. UPSAL. PATR. HOLM. ET CIV. OECON. FINL. HONOR. WERMEL. JUNEC. WEST M. CALM. ET ÖREBR. BEROL ET FRANCOF. ET LIPS. NAT. SCRUT. PARIS. HAFN. MOSCOU ET HALENS. HIST. NAT. GORENK. PHILAD. LUND. HARL M. AMSTELD. BONNENS. OECON. ET INST. LITT. ZELAND. NIDROSIENS TURICENS IENENS. LINN. LONDIN. MEDICO-BOTAN. ET HORTI-CULTUR. REG. SCIENT. PHYS. ET PHYTOGRAPH. GÖTTINGENS. SCIENT. GOTHOB. MONACH. ERLANG. WETTER. NANCIENS. MARPURG. MED. PARIS. EMUL. ET LINN. MONSPEL. MED. MATRITENS. MED. ET NAT. STUDIOS. EDINBURG. ET PETHOP. MEDICO CHIR. ET PHARMAC. MEMBRO NEC NON ACAD. SCIENT. PARIS ET INSTITUT. NATION MONSPELIENS. AGRICULT. PARIS. MEDIC. LONDIN. SCANDINAV. FLORENTIN. ET BATAVIN. IND. OR. CORRESPOND.

P. P.

JONAS JOH. ENGHOLM

VERMELANDUS.

IN AUDIT. BOTANICO DIE XVI APR. MDCCCXXV.

H. A. M. S.

UPSALIÆ

EXCUDEBANT PALMBLAD ET C.

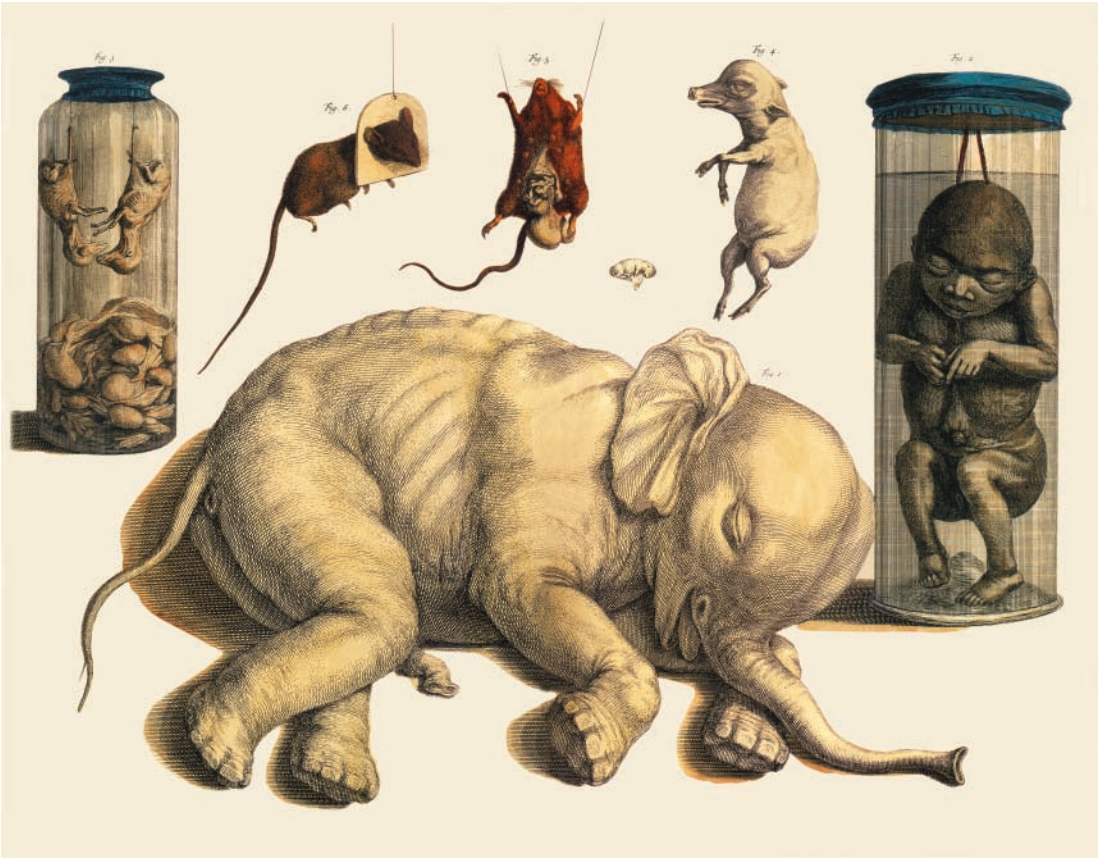
Florula Ceilanica (1825), an obscure listing of Sri Lankan plants by Carl Peter Thunberg.

Carl Peter Thunberg (1743–1828).

however, in Vienna) worked in Tranquebar, now Tharangambadi, a Danish colony from 1620–1845, on India's south-western Coromandel coast. Rottler corresponded extensively with Banks, built a herbarium and prepared a catalogue of plants of the region, but this was never published: the manuscript remains at Kew. He donated much of his material, however, to Nathaniel Wallich for the latter's revision of William Roxburgh's (1751–1815) *Flora Indica*. Rottler visited Sri Lanka in 1788 and 1795, working briefly as an assistant to Hugh Cleghorn (1752–1837), who was to become secretary to Frederick North, from 1798 to 1805 (the first) British Governor of Sri Lanka.

Another of Linnaeus' students, Carl Peter Thunberg (11 November, 1743–8 August, 1828), also botanised briefly in Sri Lanka, arriving in Colombo via Japan and Java in July 1777. Having made an extensive collection of plants (especially between Colombo and Galle), he departed Sri Lanka in February 1778, travelling to Sweden via Amsterdam. While he was the author of the first detailed flora of Japan (*Flora Japonica:* 1684), Thunberg himself did not write extensively on his Sri Lankan collections. The autobiographical account of his travels (Thunberg, 1788–1793; 1795), including his visit to Sri Lanka, was translated into several languages in his own lifetime.

Thunberg arrived in Colombo on 30 July, 1777, and prevailed upon Governor Yman Wilhelm Falck to give him the services of a native (*ayurvedic*) physician, accompanied by whom he "made daily excursions in the vicinity of Colombo, and collected diligently, with the sweat of [his] brow, in the circumjacent districts, the various productions of the land". Thunberg's interest in Sri Lankan plants was focused primarily on their medicinal value. Of the native guide assigned to him he wrote: "The fellow traveller appointed me was one of the most skilful physicians



Human and elephant embryos depicted in Albertus Seba's (1734–1765) *Locupletissimi rerum naturalium thesauri...*

of the country, who communicated to me always both the Ceylonese and Malabar [probably Tamil] names of each plant, as well as the manner in which it was used in different diseases."

Armed with a copy of Johannes Ruell's (1708) grammar of the Sinhala language, *Grammatica of Singhaleesche Taal-kunft*, Thunberg made copious notes on the properties and uses of almost every plant he encountered. The local Dutch administration, however, was not long in turning to their own use his impressive botanical knowledge. He was requested to inspect a consignment of cinnamon procured from the king of Kandy, and "found it to be adulterated and spoiled, tasteless and bad." Investing a considerable portion of his time in the island on a study of cinnamon, Thunberg noted that the seeds of these trees were dispersed by birds, and recorded the fact that Colombo's Cinnamon Gardens represented one of the earliest attempts at cultivating the crop.

So high was the economic worth of cinnamon, however, that Thunberg accepted with relish a commission to make a scientific report on the industry. Having travelled to all the cinnamon growing areas, he concluded correctly, "The southwest of the island is the only part which produces the finer sort of this pleasant and excellent cordial spice, and the places, whence it is chiefly procured, are near Negombo, Colombo, Kalutara, Barbary [Bentota], Galle and Matara, all of which lie along and near the sea coast."

Thunberg's excursions in Sri Lanka, con-

ducted on a palanquin "carried by several Moors", extended as far south as Matara. He observed that rather than transporting harvested cinnamon to Colombo, trading vessels purchased and picked up the produce from numerous coastal towns. He learned, from the cinnamon peelers of the 'Schjalia' caste, that they recognized ten varieties of the plant (currently, eight species of *Cinnamomum* are recognized from Sri Lanka, all of them endemic: Kostermans, in Dassanayake *et al*., 1995).

Nothing was spared Thunberg's searching gaze. He recorded the utility of coconuts, the hazards of plumbago mining, the diversity of Sri Lanka's plants and animals, the availability of iron ore, the pearl fishery, the various religions practised, the culinary arts (including details of no less than 15 recipes for *polos*, the tender young fruit of the Jak tree, *Artocarpus heterophyllus*), architecture and costume, and devoted fully 15 pages to the kinds of precious stones occurring in the island.

He also witnessed the capture and sale of elephants: "A tame elephant is commonly sold for 200 rix-dollars; but if it has any blemish, for instance, if its tail has been plucked off, one of its ears slit, if some of the nails be wanting on its feet, or if it has suffered any other kind of damage, they deduct from the purchase money for every defect, from 50 to 60 or 80 rix-dollars, according to the different nature and importance of the blemish. And as it is very rare to find an elephant free from every kind of blemish, those that are so, are most commonly sold from 500 to 1,000 rix-dollars. When the time arrives for holding the auction, it is customary for two, three or more persons, to purchase conjointly 50, 60, 80 or 100 elephants, which they afterwards dispose of in separate lots, with great profit. Previous

A feature common to the early workers on Sri Lankan botany, including Hermann, Burman and Linnaeus, was the adoption of local names. Later authors too, in many cases Latinized local names for use as taxon names. Specific epithets such as *pes-tigris* (derived from the Sinhala name, divi-adiya=leopard's foot[print]), *kapuru-kurundu* (cinnamon camphor), and *luni-ankenda* (lunu=salt, an=horn, kenda=fibre—because the fruits contain a separate, horny endocarp; this was evidently applied to the wrong plant) are common examples. However, the Latin names of several genea too—some of them now in the synonymy—have local-language (Sinhala, unless otherwise stated) roots.

Adhatoda	adhathodai; Tamil, ada = goat, thodai = not touch; suitable for hedges: not eaten by goats
Doona	dun = smoke, an allusion to the colourless resin exuded by the trunk, used for incense
Elephantopus	et adi = elephant foot
Embelia	aembilla ~ embul = sour
Ixora	corruption of the Sinhala name for the Hindu god Iswara
Kokoona	kokun [indigenous name]
Languas	corruption by Koenig of Hermann's allugas; alu = ash, gas = tree
Moringa	from the Malyalam, murunga
Mussaenda	[indigenous name]
Nagassarium	na = *Mesua*, gas = trees
Naravelia	nara = nerve; wela = a climber
Nelumbium	(also *Nelumbo*): nelum = lotus, the rhizome is nelumbu-ala
Pavetta	pawatta [indigenous name]
Pothos	pota-wel, [indigenous name] a climber; derived from Hermann's transliteration, *Potha*
Samadera	sama = equal; adara = affection (apparently because every part is bitter).
Tarenna	to cross a river; an allusion to the strength of the wood
Wissadula	wisa = poison; duli = duvili = dust (in fact a reference to *Centepeda orbicularis*)

to the sale, the elephants are marked on the rump with the company's arms. For this purpose, the animal is bound fast to a strong tree, and burned with red-hot iron."

Thunberg noted also that the Dutch, unlike the bloodthirsty and sport-crazy British who would decimate the elephant population a century hence, saw elephants as "uncontestably one of the most sagacious and gentle animals in nature, an animal which, notwithstanding its unparalleled size and strength, very readily suffers itself to be tamed... When he is brought into trouble and distress, he whines almost like a child... The elephant is never, or at least very seldom, shot in this country, as they prefer catching it alive; neither does one find here any great elephant hunters." Cruelty to pachyderms, however, was not unknown: "I was informed that upon a female, which was bound fast to a tree, thirteen shot were fired from a common musket, before she fell. The reason for killing her was, for the sake of cutting out the foetus, with which she was pregnant, in order to send it, preserved in arrack, to his Royal Highness the Hereditary Stadtholder's Collection of Natural Curiosities in the Hague" (see Seba's illustration on p. 55).

On 6 February 1778 Thunberg boarded ship at Galle for his return voyage to Europe, taking time off to make a little money on the side:

> Previous to my departure, I purchased a quantity of dried fruits of betel-pepper, which is sold here at a cheap rate, and at the Cape of Good Hope brought a considerable profit, of at least 100 per cent. As the slaves and Indians have every where free access to fresh betel-leaves, which they chew daily, it necessarily follows, that the slaves in those places, where the coolness of the climate does not allow of the cultivation of this pepper, must content themselves with using the fruit instead of the leaves.

The British Period (1796–1948)

In 1796 the British East India Company captured Trincomalee. The Company then succeeded in inducing a regiment of Swiss mercenaries in the pay of the VOC in Colombo to change sides, leading to the swift capture of the capital. Insensitive administration by the British EIC, however, soon precipitated a revolt among the Sri Lankans, and in 1798 Frederick North was sent as the colony's governor. Then, with the Treaty of Amiens in 1802, Sri Lanka became a crown colony of the British.

Among North's first appointments, in 1799, was a mysterious Frenchman named Eudelin de Jonville (also spelt 'Ionville' by North; de Jonville himself sometimes used the Christian names John and Joseph), whom he appointed as Superintendent of the cinnamon gardens. Cinnamon was, of course, at the time the island's most valued export commodity. In addition to the Slave Island garden, de Jonville was also charged with tending the fledgling botanic garden in the grounds of the governor's villa at Peliyagoda. De Jonville's inclination however, was not so much to supervise the production of cinnamon or to develop botanic gardens but to engage in natural-history exploration. On 1 February 1800 he wrote North (*Ceylon Records*, vol. 4, at the Commonwealth Relations Office library, London),

> "Your Excellency has been pleased to request I would inquire into, and Collect, whatever regards the Natural philosophy, the natural history, and the meteorology of this Island… I have done so, circumscribed however as I have hitherto been, by the greater importance of the [cinnamon] gardens which surround Colombo… I have not yet been able to Extend my researches to those situated in the interior, and at the Extremities of the Island."

In March that year, de Jonville's wish came true in his being appointed to General MacDowall's mission to the court of King Sri Vikrama Rajasimha at Kandy in the capacity of 'naturalist, draughtsman, interpreter [he spoke Portuguese, Sinhala and English] and receiver of presents' (Archer, 1962). On his return from Kandy, he was appointed Surveyor-general of the colony, which position enabled him to continue making natural-history collections and drawings, which in turn were sent to the Company's museum in London. The Daybook entry for 2 June 1802 at the East India Company's library in London records the receipt of "Three Chests containing a Collection of Insects, Shells, Minerals and other objects of Natural History, made at Ceylon by M. Jonville, accompanied by a Memoir in French and Sundry Drawings". While none of de Jonville's specimens (or even a listing of them) survives, three volumes of drawings and manuscripts titled *Quelques Notions sur L'Isle de Ceylan*, are yet at the India Office Library in London (MSS. Eur. E 80–2).

These volumes, dated "Colombo, Fevrier 1801", show de Jonville to have been not only an accomplished artist and student of natural history, but also a man of wide learning, equally at home with the sciences, the arts, anthropology and sociology. Following a brief preface (see p.166), he presents in Volume 1 (which comprises 494 pages of approximate size 37½×23½ cm), a 40-page account of Sri Lanka's religion, costumes, marriage (and divorce) customs, caste structure and music (some of which is presented in musical notation). Part of this was published as Chapter 15 ('On the religion and manners of the people of Ceylon by Mr. Joinville') of *Asiatick Researches* in 1801. Here, de Jonville was not bashful even about the baser side of Sri Lankan life: "Prostitution, as a profession, is permitted," he wrote.

> "It is even respected, and is called *Vaissia Darmi—Darmi* means *trade, state, employment.* It is, however, subject to some very inconvenient restrictions.—If a man appear before a woman of the above description, and declare that he will marry her, giving her at the same time a ring, a flower, or some other thing, as a token of his sincerity, she must remain faithful to him, though he should abandon her for years, and leave her without the means of subsistence. Sakreia one day transformed himself into an old man, and going to a *Vaissia*, to try her, made her the necessary declaration, gave her a flower, and disappeared. At the end of twelve years, the poor woman, who with the greatest difficulty had supported herself, prayed to heaven in a strain of grief, that he, who had given her the flower, she then held in her hands, might return. At that instant Sakreia appeared in all his glory, congratulated her on her fidelity, and blessed her with affluence."

The remainder of Volume 1 is devoted to a variety of other topics, including a Sinhala alphabet, an account of the 1800 embassy to the king of Kandy by Major General Hay Macdowall, a description of traditional drums and drumming, illustrations of costumes and accounts of travels to Galle and Matara. Pages 159–231 comprise descriptions of plants, while pages 291–306 contain descriptions of between half a page and two pages each 13 species of mammals, 307-338 birds, 343–356 reptiles and 363–494 insects (interestingly de Jonville devoted more space to insects than to any other group). Volume 2[9] contains 184 annotated folios (38×26½ cm) of 19 pencil sketches and 166 watercolour drawings of plants (the manuscript volume contains descriptions of 153 species); and a volume of zoological drawings, including two mammals (see example on p. 96), 28 birds, eight snakes, one lizard, one frog and numerous scorpions, spi-

Opposite page: the lotus—botanical drawing by Eudelin de Jonville, *ca* 1800, in the India Office Library, London.

ders, cicadas, crabs, leaf insects, stick insects, mantises and 17 plates of butterflies (see also Deraniyagala, 1958). The third volume contains 76 drawings (approximately the same size as Volume 2) of two mammals, 25 birds, eight snakes, 34 insects, a few marine invertebrates, an agamid lizard and a bat.

The only subsequent reference to de Jonville in his lifetime was by North, on 24 April 1801, who forwarded a report by the Frenchman on the pearl fishery (now *Ceylon Records*, vol. 6, at the Commonwealth Relations Office library, London). With that, as mysteriously as he appeared in 1798, de Jonville vanishes from the record. Clearly he was an exceptional man, and his 'disappearance' after flourishing for just three years, remains a mystery.

With the last bastion of indigenous power, the mountain kingdom of Kandy, falling in 1815, British dominion over the island was complete and was to last 134 years, ending only with Independence in 1948. With a stable government in place, the stage was set for economic exploitation of the island. Immigration from the British Isles, up to then a trickle, grew rapidly with the mid-19th century economic decline in Britain, exacerbated by the potato famines. Thousands of Britons fled to the colonies to take up careers as 'planters'.

The combination of British establishmentarianism and enterprise saw a remarkable growth in natural-history studies in the course of the century, especially in the field of botanical exploration and herbarium building. From the outset, the pace was set by Kew (under Joseph Banks' tutelage), which became directly involved in the advancement of floristic studies and the establishment of numerous botanic gardens in the island. This was a model the British Museum (Natural History) was never to follow, much to the detriment of zoological studies in the colony.

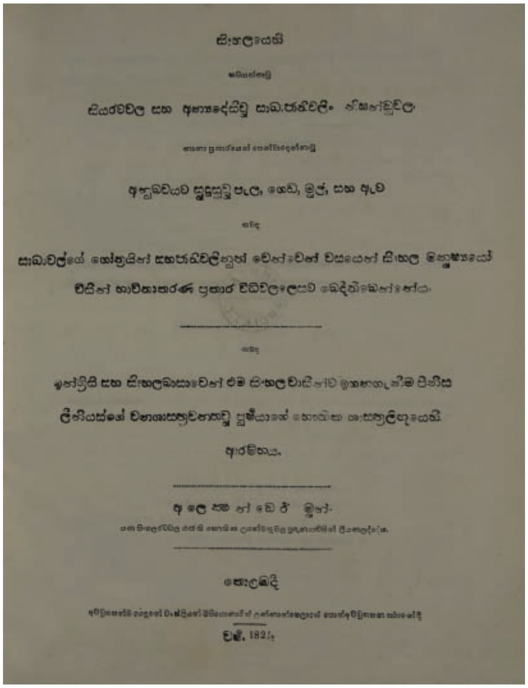
In 1810 Joseph Banks drew up a plan to establish a botanic garden in Sri Lanka and,

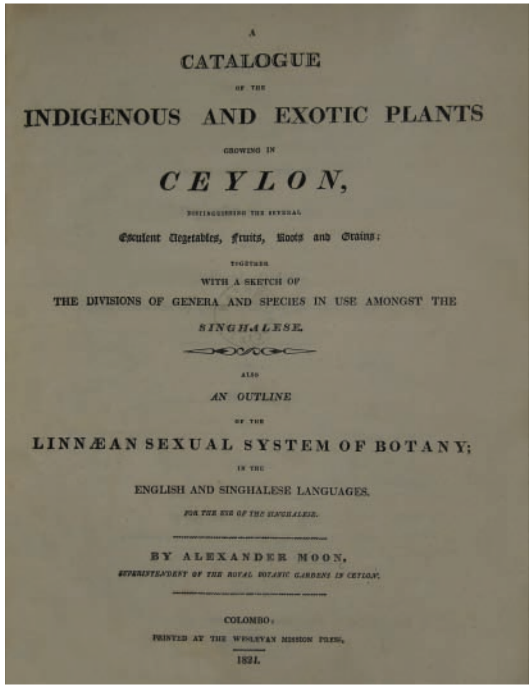
Maria Graham

Maria Graham (1785–1842, *née* Dundas, later Callcott) was a self-taught artist better known for her authorship of travelogues and children's books. In 1808, Maria accompanied her father, a naval officer who had served under Nelson, to Mumbai, where he had been appointed to head the East India Company's dockyard. There, following a shipboard romance, she married Captain Thomas Graham the following year, after which she toured widely in both India and Sri Lanka, where she executed a number of botanical drawings. Having returned to London in 1811 she published *Journal of a residence in India* (1812) and, after an extended tour of Italy in 1819, *Memoirs of the life of Nicolas Poussin* (1820), the French Baroque painter.

In 1822, on a voyage to South America, Graham's husband died, and she took up residence at the port city of Valparaiso, Chile. Perhaps more importantly, she experienced the great Chilean earthquake of that year, of which she published an account in *Transactions of the Geological Society of London* the following year (Graham thereby became the first woman to publish in that journal). Her description of the earthquake—especially her novel claim that it caused uplifting of large extents of land out of the sea—however, did not find favour with the Society's president, George Bellas Greenough (1778–1855) who, in a lecture to the Geological Society (Greenough, 1834), publicly accused Graham of lying (Kölbl-Ebert, 1999). Spurning her husband's and brother's offers to challenge Greenough to a duel to defend her honour, Graham published a crushing reply to Greenough's criticisms (Graham, 1823). The dispute was finally resolved in Graham's favour the following year by Charles Darwin, who was to witness the sequel earthquake while in Chile in 1835, where uplift was indeed observed to occur (Darwin, 1838).

Graham returned to England in 1823, and shortly thereafter obtained an appointment as governess to Donna Maria, daughter of the Prince of Portugal and Emperor of Brazil, a position she retained until 1827. Returning to England, she married the painter Augustus Wall Callcott (1779–1844).





A

CATALOGUE

OF THE

INDIGENOUS AND EXOTIC PLANTS

GROWING IN

CEYLON,

DISTINGUISHING THE SEVERAL

Esculent Vegetables, Fruits, Roots and Grains;

TOGETHER

WITH A SKETCH OF

THE DIVISIONS OF GENERA AND SPECIES IN USE AMONGST THE

SINGHALESE.

ALSO

AN OUTLINE

OF THE

LINNÆAN SEXUAL SYSTEM OF BOTANY;

IN THE

ENGLISH AND SINGHALESE LANGUAGES.

BY ALEXANDER MOON,

COLOMBO:

PRINTED AT THE WESLEYAN MISSION PRESS,

1824.

Title pages of Alexander Moon's 1824 *Catalogue of theindigenous and exotic plants growing in Ceylon,* possibly the first scientific book ever to be published (simultaneously) in Sinhala.

with the concurrence of King George III, nominated William Kerr (?–1814) as its first Superintendent and Chief Gardener (Carter, 1988). In selecting Kerr, Banks had a clear idea of the sort of man he wanted: "A botanist... not only skilled in horticulture but also in the names of plants &c".

Kerr arrived in 1812 and took over management of the gardens of King's House in the Fort and the fledgling seven-acre botanic garden established two years previously on the site of the neglected Dutch garden in Colombo's 'Slave Island' (which was not in fact an island, though it had housed the Dutch East India Company's slaves in former times). The gardens were nostalgically named Kew by its new English owners. In addition to 'Kew Gardens' was the botanic garden that had been established in the grounds of the governor's mansion at Peliyagoda, on the banks of the Kelani Ganga (river), 13 years previously by Eudelin de Jonville. In his *Hand Guide to the Royal Botanic Gardens, Peradeniya,* Trimen (1885b) noted that 'Kew Gardens' was neglected by the British and subsequently sold in lots in 1822, by which time the Royal Botanic Gardens had been established at Peradeniya.

It is certain that one or more botanic gardens had existed in Colombo during the Dutch period, though the nature of their activity and their exact locations are not entirely clear. *Ceylon at the Census of 1911* (p. 153) notes,

> "The name of van der Meydens Polder still remains in the heart of Grand Pass, to recall the fact that it was in Dutch times a model farm… Evidence of other agricultural experiments in this part of town is to be found in the name of the village Sedawatte, which was Orta Seda or silk garden, where experiments were made with silk worms introduced from Japan by the Portuguese. There was also an experimental station in Grand Pass, close to the banks of the river, known as Orta Fula, which became Malwatha, the flower garden."

Kerr had spent the preceding nine years at Canton (now Guangzhou, China), Java and the Philippines botanising and collecting plants for Kew. Once in Sri Lanka, Banks urged him to explore the island's flora, begin work on a herbarium for the use of local botanists, and experiment with the cultivation in Colombo of Chinese plants (Desmond, 1992). In 1811, Banks also tried to send along with Robert Brownrigg (1759–1849; Governor of Ceylon, 1812–20), William Jackson Hooker (1785–1865), a botanist of note, who had participated in a plant-collecting expedition to Iceland in 1809 (Desmond, 1992; 1994). Hooker, however, declined the offer: exploration in the interior of Sri Lanka was at the time unsafe, given the tension that existed between the British Government and the kingdom of Kandy until 1815. He went on to become Director of Kew from 1841–1865, in which position he was well placed to play an important role in supporting the botanical exploration of Sri Lanka.

In November 1814, almost before he could get started, Kerr died. Prior to that, however, he had determined that the Slave Island site was both too small and too low to serve as a botanic garden: it was subject to periodic flooding. He began relocating the gardens to part of an abandoned 600-acre sugarcane plantation that had come into the government's possession at Kalutara. The venture was still in the planning stage, however, at the time of his death.

In 1815, Major-General Thomas Hardwicke (*q.v.*) (1756–1835) of the Indian army, himself a natural historian of distinction, inspected the site at Kalutara and reported to Banks (Desmond, 1992):

> "It is a small spot on the borders of an extensive lake but in a situation very flat and not sufficiently elevated above the surface of the water for the purpose of a garden. For a short time plants placed here thrive, but when the roots extend below the insufficient thickness of dry soil their growth is checked and the greater part gradually decay and perish".

Sir Joseph Banks (1743–1820), shortly after returning from Australia in 1771, whence he had accompanied James Cook on the *Endeavour,* via South America and across the Pacific.

Regardless of Hardwicke's misgivings, however, the government went ahead with the move.

As Kerr's replacement, Banks recommended another Kew gardener, Alexander Moon (?–1825), a "smart young man trained at Kew", who botanised in Gibraltar and the Barbary Coast of Africa *en route* to Sri Lanka. Having arrived in Colombo in early 1817, Moon was able to repay Banks' confidence in him by completing exploration of the province of Kandy by 8 May, 1819 and shipping to Kew 373 kinds of seeds and to the British Museum some 50 bird and mammal skins (Carter, 1988). The importance the colonial

government attached to Moon's post can be gauged by his salary, a (then) princely £ 512 per annum.

With the deposition of the Kandyan king in 1815, the whole of Sri Lanka was now under British administration and Governor Brownrigg finally decided to move the gardens from Kalutara to Kandy. Not least among his motives was that in Kandy, it would be possible to experiment with the cultivation of coffee (Stockdale *et al*., 1922), a crop that had been grown experimentally in Sri Lanka since *ca* 1690 (Trimen, 1885b). What is more, European vegetables could be grown for the governor and colonial administrators in Colombo, a tradition that continues even today, the botanic gardens being the official supplier of vegetables to the President of Sri Lanka.

Moon's first task then, was the relocation of the gardens from Kalutara. The new gardens would be situated at Peradeniya, on the site declared a royal garden in 1780 by King Kirthi Sri Rajasinghe. Situated on a loop in the river (see map on p. 86), the 150-acre site was surrounded on three sides by the Mahaweli Ganga (river). It had, since Wickramabahu III in 1371, served intermittently as an orchard and used as a pleasure-garden by the Kandyan royalty. Located on the outskirts of Kandy, 500 m above sea level and bordered by the Mahaweli Ganga (river), the Royal Botanic Gardens were finally established in 1821 (the royal appellation was an allusion to the Kandyan royalty, not the British). The transfer of all the plants and trees of interest from Kalutara to Peradeniya, however, was to take two decades. Nevertheless, the move proved propitious: from 1821 onwards, the history of botanical exploration in Sri Lanka would in effect be a history of the Royal Botanic Gardens, Peradeniya.

Even while setting out the gardens, Moon continued to botanise despite lacking access to the botanical literature of the time (Pethiyagoda, 1999). In 1823 he dispatched a collection of 45 of Harmanis de Alwis's (see below) watercolour drawings to the British Museum, together with manuscript descriptions that were, however, never published; these are still in the collection of The Natural History Museum, London.

The following year Moon published his *Catalogue of the indigenous and exotic plants growing in Ceylon*, the letterpress being presented in both English and Sinhala. In all, 1,127 species were listed, 366 of which were being cultivated in the Gardens themselves, a further 761 being recorded from the wild, fully 164 of them considered new to science. The work is of slight importance however, for it is merely a listing of plants with no descriptions, and unrelated to specimens in the herbarium (Moon did accumulate a sizeable herbarium, but it was lost in the two-decade interregnum that followed his death). Shortly after publication of the *Catalogue*, Moon died, probably of malaria. His most lasting contribution to botany was arguably the discovery of his protégé, Harmanis de Alwis [later Seneviratne] (1792–10 June, 1894).

The 26 year-old Alwis, a native of Kalutara, was employed by Moon as a 'native writer' in 1818. Moon discovered that the young man was a talented artist and paid from his own pocket for lessons to develop his skill (Boulger, 1900). Soon, Alwis was collecting plants from the wild, depicting them from life and preparing herbarium specimens. In 1823, Moon was able to secure for Alwis a tenure appointment as draughtsman to the Peradeniya Gardens. He was to hold this post for 38 years, retiring only in 1861, aged 70. After Moon's death, Alwis kept himself occupied by systematically drawing the increasing number of plants that came to his attention. Much of his drawing was done in the field, exploring the then barely-accessible rain forests of Sri Lanka. In the course of his career, he was to delineate more than 2,000 plants, many species more than once. As his skill

developed, he also delineated dissections. In 1831, in recognition of Alwis's exceptional work, Governor Edward Barnes (1776–1838) conferred on him the title of Muhandiram. In accordance with custom, Alwis took on an additional name, Seneviratne.

Following Moon's death in 1825, standards at the botanic garden deteriorated steadily. Soon it was no more than a farm for growing garden vegetables for the Raj in Colombo. (Banks, a champion of Sri Lankan botanical exploration, had died in 1820.) Andrew Walker acted as Superintendent from 1825–1827, when James Macrae succeeded him. Macrae had collected plants in South America for the Royal Horticultural Society, and *ca* 1823 also served in the botanic garden at St. Vincent. At Peradeniya he took a special interest in orchids, which he cultivated in considerable numbers in the Gardens. He died in June, 1830, however, and G. Bird served briefly as Superintendent, until James George Watson (? –July, 1838), an Anglo-Indian employed as a gardener by Nathaniel Wallich (28 January, 1786–28 April, 1854) at the Calcutta Botanic Garden, took over in 1832. In early 1839 it was Wallich who, having explored Assam for indigenous varieties of tea (*Camellia*), had sent the first seeds of this soon-to-be-important crop to Peradeniya (a few plants had been imported in 1824 (Trimen, 1885b), but these had been maintained at Peradeniya merely as curiosities). Watson did not find favour, however, with the Adjutant-General of Ceylon (from 1830–37), General George Warren Walker (?–1844) who was a competent botanist in his own right. Walker, who was also a correspondent of William Hooker, to whom he sent large quantities of Sri Lankan herbarium material, described Watson as "An ignoramus who could not read the language of botany" (Desmond, 1994). Nevertheless, both Watson and Walker continued to send specimens to Kew, though little research was undertaken at the Gardens themselves, except

Courtesy of the Royal Horticultural Society

Harmanis de Alwis Seneviratne, drawn by an unknown artist.

Vatica lewisiana (Dipterocarpaceae), by William de Alwis.

Stemonoporus revolutus (Dipterocarpaceae), a genus and species endemic to Sri Lanka, by William de Alwis.

Courtesy of Sonali Samarasinghe

Harmanis de Alwis Seneviratne, on his elevation to Mudliyar.

Courtesy of Sonali Samarasinghe

Ceremonial sword awarded to Harmanis de Alwis Seneviratne on his elevation to Mudliyar.

Robert Wight (1796–1872).

for Alwis's continued labours in the delineation of plants.

In 1836 Robert Wight (6 July, 1796–26 May, 1872), superintendent of the botanic gardens at Madras (now Chennai), India, visited Peradeniya and saw Alwis's productions. So impressed was Wight that in 1839 he arranged for Alwis to travel to Madras for instruction in botanical dissection and making drawings with the aid of a microscope. During his three-month sojourn in Madras, Alwis was not only to master these specialities, but actually make several drawings for Wight's forthcoming *Icones* (1840–53) (Burkill, 1965a,b; see also Basak, 1981).

When Watson died in 1838, J. G. Lear, a pioneer planter in Sri Lanka, acted as Superintendent of the gardens until a replacement could be found. Lear was an enthusiastic collector, specialising mostly in orchids, and sent significant collections, living and preserved, to England. He was followed by two part-timers, Harry Thomas Normansell (? –7 June, 1843) and William Charles Ondaatje (? –October, 1888), the latter of whom, a surgeon, was a student of medicinal plants.

It was not until 1841 however, that Hooker was appointed Director of Kew, and was finally able to make good his contribution to Sri Lankan botany. In 1844 he appointed George Gardner (1812–10 March, 1849), a former pupil of his, superintendent of the Peradeniya Gardens.

An MD from Glasgow (1835), Gardner had travelled and collected extensively in Brazil in 1840–41 prior to his appointment to Sri Lanka, and wrote his *Travels in the interior of Brazil* (1846) *en route* to the island. He was keen to publish a work similar to Wight's *Icones* for Sri Lanka, and soon Alwis was given the task of drawing the plates: 'Many new coloured drawings of Ceylon plants have been

Courtesy of Royal Botanic Gardens, Kew

Sri Lankan mushrooms, from a collection of *ca* 1,000 specimens figured by William de Alwis Seneviratne.

made by the draughtsman, for the general work I am now preparing on the botany of the island', Gardner wrote in 1847.

Gardner was not only a competent botanist and manager, but also, unusually for his time, an ardent conservationist. He was deeply concerned by the large-scale clearance of Sri Lanka's virgin forests for the cultivation of coffee, and in the Gardens' *Annual Report* of 1844 (the year in which he arrived in Sri Lanka) lamented that "Botanists of future times will look in vain for many of the species which their predecessors had recorded in the annals of science as natives of the Island."

It was Gardner who, almost two decades after the death of Moon, finally began restoring the Gardens, developing them both as a venue for recreation and a centre for scientific research. Importantly, he saw that Alwis's large collection of drawings comprised "rather pictures than scientific drawings." Gardner did Alwis a great service by compelling him

to depict plants in a manner suitable for technical publication, complete with dissections.

Showing Prince Waldemar of Prussia around the Gardens in 1844 (when Gardner was convalescing in Madras), Alwis had impressed the prince's physician, the botanist Werner Hoffmeister: 'We found [Alwis] well qualified to act as a most efficient cicerone, and even acquainted with the botanical names of the plants and their classification,' he recalled (Hoffmeister, 1848). Well pleased with Alwis's work, in 1844 Gardner petitioned for an increase in Alwis's salary (then just £3 per month) stating in the 1844 *Annual Report,* "His equal as a native botanical artist I am certain does not exist in India." Then, on 10 March 1849, aged just 37, Gardner died of 'apoplexy' (evidently stroke) while on a visit to Nuwara Eliya and his ambitious project to publish illustrations of the entire Sri Lankan flora was forever abandoned.

During his tenure of just five years, Gardner's industriousness laid a firm foundation for future botanical researches in Sri Lanka. He was amongst the first botanists to make a large-scale collection and study of the Sri Lankan mosses, a task later taken up with zeal by G. H. K. Thwaites. It was largely their collections that enabled William Mitten (30 November, 1819–27 July, 1906), the British bryologist, to write *Musci Indiae Orientalis,* his monograph on the mosses of India and Sri Lanka (O'Shea, 2003).

Gardner was also able to persuade the Colonial Secretary, Sir James Emerson Tennent (*q.v.*), himself a keen student of natural history, to support his project for a flora of Sri Lanka. He guided Alwis to produce scientific drawings rather than pretty pictures of plants. He inspired the young William Ferguson (July, 1820–31 July, 1887) in the Ceylon Civil Service to study the algae of Sri Lanka and write extensively on trees (Ferguson's son, also William, was a well known ornithologist and in 1887 published a checklist of Sri Lankan birds together with Sinhala and Tamil names, incorporating notes provided by Samuel Bligh, a tea planter at Haputale who was also a keen student of Sri Lankan birds). Ferguson Sr was an early worker on Sri Lanka's algal flora, on which his *Algae ceylanicae*, based on species determinations by Albert Grunow (1826–1914), was a pioneering work. A competent botanist, Ferguson sent regular consignments of specimens to both the Royal Botanic Gardens, Kew and the then British Museum (Natural History), while also writing popular botanical books such as *Descriptive list of Ceylon timber trees* (1863). A series of Sri Lankan algae preserved by him and deposited in The Natural History Museum, London, was reported on by Murray (1887). Ferguson's Sri Lankan algal collections were augmented also by Odoardo Beccari (1843–1920), an Italian botanical explorer and Cesare Marcacci, both of whom collected algae in Singapore and Sri Lanka. Ferguson himself was the first botanist after Linnaeus carefully to review, on a visit to England in the mid-1850s, Hermann's herbarium, allocating its species to 'modern' genera.

Memorial to George Gardner at the Royal Botanic Gardens, Peradeniya.

By far the most celebrated early collector of algae, especially the marine algal flora of the Indian Ocean, was the Irish botanist William Henry Harvey (5 February, 1811–15 May, 1866), who provided entertaining accounts of his adventures in letters to family and friends (Ducker, 1977). A physician qualified at Dublin, Harvey was from 1836–42 Treasurer of the Cape Colony, later taking up an appointment as Keeper of the herbarium at Trinity College, Dublin, going on to become Professor of Botany there in 1856. Harvey stopped in Sri Lanka on the way to the Swan Colony (Western Australia), arriving on 5 September and leaving on 25 December 1853. During this period he collected sufficient specimens to be distributed as an exsiccata (Harvey, 1854). While in Australia, he published a paper describing three spectacular reticulate Delesseriaceae from Ceylon: *Claudea multifida*, *Martensia fragilis*, and *Vanvoorstia spectabilis*, the latter representing a new genus named for John van Voorst, the London publisher of some of his books. Most of his Sri Lankan collections, however, were reported on by Friedrich Traugott Kützing (1807–1893) and Jakob Georg Agardh (1813–1901), as Harvey was busy pursuing other projects. Harvey also attracted notoriety as an ardent opponent of natural selection.

Perhaps the most important of Gardner's protégés was John George Champion, born to a military family in Edinburgh, Scotland, on 5 May, 1815. Following his father, he was trained at Sandhurst and in 1835 received a commission in the 95th Regiment, which had since 1805 been associated with Sri Lanka. In 1838 Champion was posted to Sri Lanka and stationed initially at Galle, where he botanised extensively, sending collections of dried plants to Cambridge, Kew and Gardner at Peradeniya.

Champion appears to have been interested primarily in ecology; his (1843: 382) observation that when land is cleared of its natural

Talipot palm at the entrance to Royal Botanic Gardens, Peradeniya, by Eugen Ransonnet-Villez, *ca* 1865 (the laterally inverted print has here been corrected).

vegetation and left unattended, the mix of species that grows is quite different to—and not as diverse as—the original vegetation, threw new light on the irreversible fate of the vast extents of forest that were then being cleared for coffee cultivation. "Vegetation depends much upon the effects of light and solar influence", he wrote:

> Leave a barren gravely soil in itself, and it will be first covered with sedge and grass, but once when weeds have effected a footing many of the grasses will disappear; next will come under-shrubs and creepers, so that the cleared space is again converted into jungle. Lastly, should also trees spring up, by the time they have shaded the under-shrubbery from the effects of the sun's rays, [they] will have materially altered in character. From these causes, there must be constant change of vegetation in the mountainous countries,

> and the lower tracts, but more especially in the former.
>
> I have been informed by coffee planters, that after clearing jungle, many plants and shrubs spring up which were previously not known in the forests, and that it is easily accounted for on those principles. I have myself found *Pavetta latifolia* from cleared coffee land, after in vain searching for it in neighbouring jungle.

From Sri Lanka, Champion was in 1847 posted to Hong Kong, where he was stationed until 1850. By then a major, he served with distinction in the Crimean War, in which, on 30 November, 1854, he was killed at Scutari, Turkey, and promoted posthumously to Lieutenant-Colonel. In 1846 Gardner named the endemic monotypic genus *Championia* in his honour, the type species of which, *C. reticulata*, had been discovered by Champion at Adam's Peak.

Apart from his duties at Peradeniya, Gardner also found time to edit the *Calcutta Journal of Natural History* (in which he wrote his 'Contributions towards a Flora of Ceylon'). He was also a pioneering student of Sri Lanka's geology and in addition to collections for the Peradeniya herbarium, accumulated a collection of some 14,000 specimens, which were purchased by the British Museum on his death in 1849.

The vacuum Gardner left was not easily filled. Joseph Dalton Hooker (1817–1911), William Jackson's son, refused the job. However, later the same year Hooker Sr. was able to persuade George Henry Kendrick Thwaites (9 July, 1812–11 September, 1882), who was Gardner's senior by a year, to take up the challenge. Thwaites had been an accountant in Bristol before he turned to pharmacology and medicine. Now aged 37, he changed his career for the third and last time; and once he arrived in 1849, he was never to leave the island.

At Peradeniya, Thwaites set about herbarium-building, landscaping and agricultural experimentation with zeal. He was an indefatigable worker and produced a prolific series of botanical papers. Although he wished to publish an illustrated flora of the island, this was never to be. The Alwises however, continued to draw, and the herbarium collection grew steadily. Thwaites himself was fascinated by cryptogams and worked relentlessly on this flora, especially ferns and fungi. He was also an ardent conservationist. Augusta Gregory, widow of Governor William Gregory (1817–1892), who edited her husband's autobiography (Gregory, 1894), noted how Thwaites zealously protected a colony of "pestilential flying foxes" in the Gardens. She noted with glee Thwaites' distress when the bats were decimated by Albert Edward Prince of Wales shooting at them during a visit to the gardens.

Between 1858 and 1864 Thwaites produced his *Enumeratio*, in which the plants then known from Sri Lanka were all listed and very briefly described. Lauded as having been at the time "the only completed flora of any tropical region" (Trimen,1885a), the book won Thwaites not only a coveted fellowship of the Royal Society but also a Ph.D. (Desmond, 1994). In the preface he was to acknowledge Alwis thus:

> I would wish to associate with this little book the names of Harmanis de Alwis Modliar, and of Don Seman De Silva Aratchy, native officers, employed during many years in this establishment, the former as draftsman, the latter as principal plant collector, to whose intelligent and hearty co-operation is due much of my success in procuring new and rare species of plants from the jungles.

For his part in the project, in 1854 Alwis had been honoured with the title of Mudliyar by Governor G. W. Anderson. After his retirement from the Gardens in 1861, he lived a healthy life in full control of his faculties (except, towards the end, his failing eyesight would annoy him), until his death on 10 June

1894, aged 101 (Thwaites himself had died in Kandy on 11 September 1882). On 1 November 1865 Alwis's son William was appointed draughtsman and formally succeeded his father. He was eventually to retire (also having been created a Muhandiram in 1896 and Mudliyar in 1901) on 28 February 1902, to be succeeded in turn by his son—Harmanis's grandson—Alfred (*Annals of the Royal Botanic Gardens, Peradeniya*, 1901–02, 1: 266).

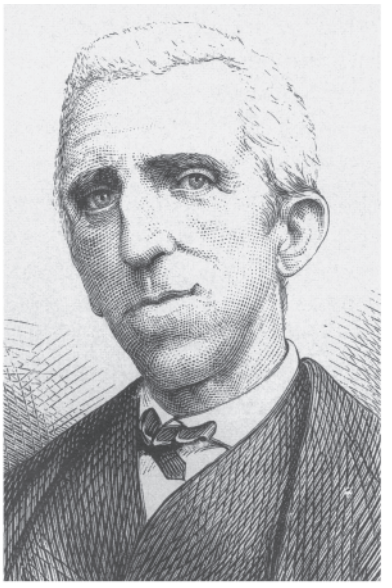
Thwaites was not just a botanist: he had an abiding love of natural history. He collected specimens of all groups of animals, from insects to mammals, preserved them carefully and sent them on to the British Museum (Natural History) where zoologists such as Albert Günther were to describe and name them. Such was Thwaites's enthusiasm that in 1874, he persuaded the governor, William Gregory, to finance a special project for William de Alwis from his (Gregory's) personal funds. William was commissioned simply to 'paint the butterflies of Ceylon', (see biography of Frederic Moore on p. 192; also Gilbert, 2000), of which Thwaites was then accumulating a large collection.

Under Thwaites's supervision, William also went on to make more than 1,000 detailed illustrations of Sri Lankan fungi, including mushrooms, from which (and the specimens relating to which) Miles Joseph Berkeley (1803–1889) and Christopher Edmund Broome (1812–1886) described more than 300 species as new to science. Copies of all these drawings, made by Berkeley's daughter Cecilia, are preserved at Kew; the originals were returned to Sri Lanka and are now with the Department of Agriculture at Gannoruwa. Incidentally, it was to Berkeley that Thwaites sent for identification samples of the fungus that devastated Sri Lanka's flourishing coffee industry in 1869: he and Broome were to name it *Hemileia vastatrix*. In the succeeding years, the blight put an end not only to the industry in Sri Lanka, but also in many other

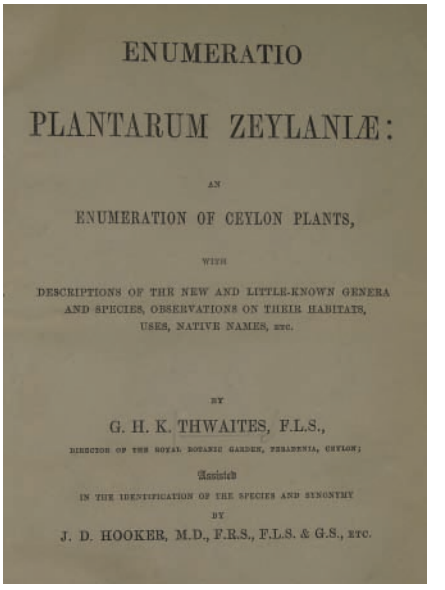
This drawing, in James Emerson Tennent's *Natural History of Ceylon* (1861), draws attention to the causes of the rapidly declining coffee industry of the time.

coffee producing countries (Forrest, 1967). It did, however, have an important if unintended side-effect: it precipitated an unprecedented flurry of entomological activity, leading to the discovery and description of hundreds of insect species.

Thwaites shared his love of ferns with his friend George Wall (1820/21–18 December, 1894), whose son, Frank (*q.v.*), would later produce the first work on the snakes of the island. Wall arrived in Sri Lanka in 1846, planting coffee around Kandy until 1854, when he moved to Colombo, to become a successful businessman, founder-chairman of the Ceylon Planters' Association and a member of the island's Legislative Council. His (1873) *A catalogue of the ferns indigenous to Ceylon*, was



George Henry Kendrick Thwaites (1812–82).



ENUMERATIO

PLANTARUM ZEYLANIÆ:

AN

ENUMERATION OF CEYLON PLANTS,

WITH

DESCRIPTIONS OF THE NEW AND LITTLE-KNOWN GENERA AND SPECIES, OBSERVATIONS ON THEIR HABITATS, USES, NATIVE NAMES, ETC.

BY

G. H. K. THWAITES, F.L.S.,

DIRECTOR OF THE ROYAL BOTANIC GARDEN, PERADENIA, CEYLON;

Assisted

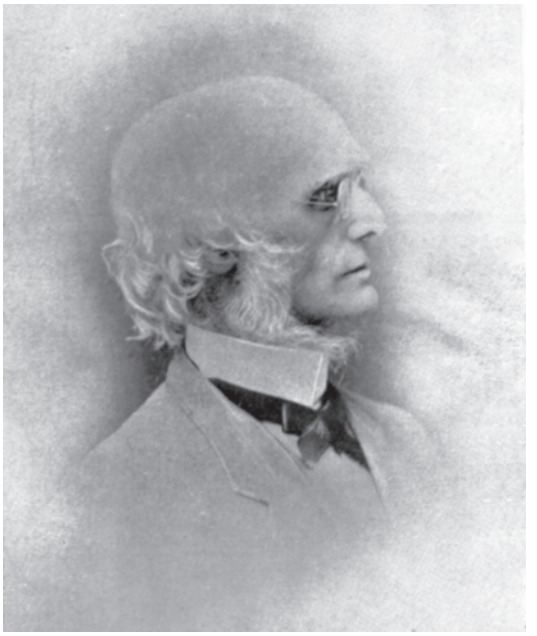
IN THE IDENTIFICATION OF THE SPECIES AND SYNONYMY

BY

J. D. HOOKER, M.D., F.R.S., F.L.S. & G.S., ETC.

Title page of Thwaites' *Enumeratio*, considered by Trimen (1885a) to be "the only completed flora of any tropical region".

The Thwaites Memorial at the Royal Botanic Gardens, Peradeniya, built in 1885 in traditional Kandyan style. In keeping with Thwaites's wishes, neither his grave nor his memorial bear an inscription of his name.



George Wall, pteridologist (1820/21–1894).

the first comprehensive survey of the pteridophytes of the island, to aid which he accumulated at Peradeniya a large herbarium of foreign ferns for comparative study.

In 1857 Thwaites became the first Director of the Royal Botanic Gardens at Peradeniya, with William Cameron, a Kew gardener, being sent to take his place as Curator. In 1874, Marcus Manuel Hartog (19 August, 1851–21 January, 1924), was appointed Assistant Director of the Gardens. Hartog was among the first investigators of rotifers in Sri Lanka. He departed, however, in 1877, and took up a position as Demonstrator in Natural History at Owens College, Manchester, later going on to become Professor of Natural History at University College, Cork, where he conducted early research on chromosomes.

Thwaites's enthusiasm for natural-history studies was contagious: not only had he enlisted the governor, William Gregory (*q.v.*), as a disciple, but also a number of planters and colonial officials, who served as his collectors. Among these, for example, was the Rev. Samuel Owen Glenie (1811–1875), who became colonial chaplain to the British forces at Trincomalee in 1834, and later (1870), Archdeacon of Kandy. Glenie made extensive collections of plants from Sri Lanka's eastern dry zone, an area neglected by Thwaites and Trimen, who focused their attention mainly on the wet zone and hill country. At about the same time Glenie began his work in Trincomalee, Charles Millett (*fl.* 1830s) also made collections in both Sri Lanka and Malabar. Also among the contributors of specimens from various districts of Sri Lanka were amateur naturalists such as Hugh Nevill, O. Brodie, J. P. Lewis and M. S. Crawford (Gunawardena, 1968). P. A. Dyke, Government Revenue Collector of Jaffna from 1829 and Government Agent from 1833–67, was also an important contributor of specimens and data from the northern peninsula.

In 1860 Thwaites established a nursery at Hakgala, near Nuwara Eliya, for the cultivation of cinchona, the tree from which the malaria cure, quinine, was derived. The introduction of cinchona to Sri Lanka, however, was the work of William Cameron, who in 1857 became Conductor of the Gardens under Thwaites, but left in 1860 to become a coffee planter. Hakgala in time became a botanic gardens for sub-tropical plants, a mixed blessing given the large number of escaped temperate exotics that have since established themselves in the surrounding montane cloud forest. It was also thanks to Thwaites that the higher mountains of Sri Lanka were opened up to cultivation: cinchona proved to be a failure, but tea readily replaced this crop. While the latter industry has been a mainstay of Sri Lanka's economy for more than a century now, it also resulted in the near-complete destruction of the island's pristine montane rain forests.

Thwaites went on to establish yet another garden, this time for the cultivation of rubber, at Heneratgoda in 1876, shortly before his re-

tirement in 1880. He spent his final years at his bungalow ('Fairieland') in Kandy. He received a coveted C.M.G. from Queen Victoria in 1878 and on 17 February, 1880, in recognition of his signal contribution to their industry, the Ceylon Planters' Association made him their first Life Member. He was buried in the Mahayaya Cemetery, but sadly, his grave is not marked; Trimen (whose grave is marked) was, in due course, buried next to him.

William (1842–30 January, 1916) and George de Alwis too, were to travel to India and work with Wight's principal artist, Govindo. Together they illustrated several Indian botanical works, including *Icones plantarum Indiae orientalis* (1869–74) and *Flora sylvatica for southern India* (1869–74) by R. H. Beddome (11 May, 1830–23 February, 1911) and also Sir George King's (1840–1909) monographs of the Indian Myristicaceae (1891) and Annonaceae (1893). At least three of Harmanis's grandsons too, were associated with the Gardens and continued the tradition of botanical illustration until after World War I. Little however, is known of them: William's son, A. G. de Alwis, was confirmed as photographer and draughtsman at the Department of Agriculture on 1 May 1915 (*Tropical Agriculturist*, July 1916: 62). A. H. G. Alston, Systematic Botanist of the Department of Agriculture, Peradeniya in his *Kandy Flora* (1938) refers to "...original drawings made by Messrs A. [Alfred, William's son] and A. G. Alwis [*sic*] under the supervision of the author." S. D. J. E. Senaratna, in *The grasses of Ceylon* (1956) writes, "Most of the drawings are by A. G. Alwis, the remainder copied from the Peradeniya Herbarium collection by A. de Alwis, formerly draughtsman..."

Harmanis Alwis's sons and grandsons also find mention elsewhere, for example, in *A manual of the weeds of the major crops of Ceylon* (1951): "...with reproduction of designs from the Peradeniya Herbarium collection by A. Geo[rge] Alwis, draughtsman...". George

Native workers supervised by British planters harvest *Cinchona* in the central highlands of Sri Lanka *ca* 1880, in this photograph by William Skeen.

de Alwis is also mentioned in *Tropical Agriculturist*, vol. 107(1), p. 29 (1951), in which journal drawings by members of the family appeared regularly, e.g. of the plant *Grewia asiatica* in vol. 100(2), p. 108 (1944). In the centenary publication of the Peradeniya Gardens (Stockdale *et al*., 1922) the following are listed as serving in the staff: E[dwin] de Alwis (Laboratory Assistant, Entomology); Edmund de Alwis (Museum Assistant); Alfred de Alwis (Draughtsman); and A.G. de Alwis (Draughtsman): all four were probably sons of William. Charles and James de Alwis (whose relationship to Harmanis de Alwis is not clear) were to delineate for H. N. Ridley (1855–1956), Director of the Singapore Botanic Gardens a large number of Singaporean and Malaysian plants. Their drawings were "of an extremely high standard, especially those of Charles. For accuracy and artistic beauty, it would be difficult to find work comparable to that of Charles de Alwis" (Tinsley, 1989).

Although the de Alwises were honoured by the British, they have received scant recognition from their own countrymen. Harmanis' had named after him by John Lindley a species of leafless orchid, *Taeniophyllum alwisii*, endemic to Sri Lanka. In honour of his work on fungi, William had named after him

Frederick Lewis

Frederick Lewis (18 July, 1857–19 July, 1930) was born in Kandy to a family of British coffee planters. His early years (1865–67) were spent on his father's estates, Mahaberiyatenna, Medakanda and Teligalle (1868–73), with the intervening period at Marlborough House, the home of his uncle, Robert Lewis, in Colombo. In September 1874, aged just 14, Frederick began his planting career, which was to continue for the next 14 years. During this period he taught himself land surveying, while devoting much of his leisure to botanical exploration. In 1880, as the coffee blight took its toll, Lewis found himself out of a job. He travelled to Borneo and worked as a rubber planter. Returning to Sri Lanka in 1884, he founded a land-survey firm and worked in the Maskeliya and Balangoda Districts, surveying land for the tea plantations that were then replacing coffee and cinchona.

Having served briefly in the Excise and Land Development Departments, by November, 1888 Lewis was employed by the recently-founded Forest Department, serving in the Sabaragamuwa Province. By 1893 he had risen to the post of Assistant Conservator and that same year put his experience in Borneo to good use, establishing a nursery for rubber at Edangoda, on the banks of the Kalu Ganga (river). In 1895 Lewis was put in charge of forestry in the Western Province and began writing *Descriptive catalogue of the more useful trees and flowering plants* (1902). He (1926) was also among the first botanists to try to explain the distribution of Sri Lanka's endemic flora on the basis of altitude, rainfall and modes of dispersal.

In 1893 Lewis travelled to England, where he visited Kew and, armed with letters of introduction from Trimen (*q.v.*), met with the leading botanists of his day. While his (1926) *Sixty four years in Ceylon* outlines his life on the island, it does not do justice to his aptitude for scientific observation. He was a keen ornithologist and an indefatigable explorer; and amongst the earliest Englishmen to warn that rampant deforestation was having serious and irreversible consequences on the island's biodiversity. He is remembered by *Vateria lewisiana*, an endemic dipterocarp named in his honour by Trimen. His *Vegetable products of Ceylon* was published posthumously, in 1934.

a genus of slime mould, *Alwisia*. The century of service Harmanis, his sons and grandsons gave to Sri Lankan botany is perhaps without equal in 19th century natural-history, and is reminiscent of van Rheede's co-opting of Itti Achuden (a Malabari 'untouchable' who had encyclopaedic knowledge of the medicinal plants of Kerala), as the virtual ghost author of *Hortus Malabaricus* (Mohan Ram, 2005).

The de Alwises left a tradition of assiduous field work that was taken up by later collectors employed by the gardens, most notably Don Seman de Silva Gunaratne, for whom Trimen named a species of *Sonerila* (since synonymized): "for many years plant collector for the Peradeniya Botanic Gardens, and the discoverer of many novelties" (Trimen, 1893–1900). Other more recent gardens collectors include A. M. de Silva and Wally Silva (commemorated by an eponymous species of *Oberonia*).

On Thwaites' retirement in 1880, Henry Trimen (26 October, 1843–16 October, 1896), an assistant in the Botany Department of the British Museum (Natural History), took over the directorship of the Gardens. An MB from the University of London (1865), Trimen was a keen amateur botanist who had worked alongside Sir William Thiselton-Dyer (1843–1928) in the preparation of his *Flora of Middlesex* (1869), going on to take employment as an Assistant in Botany at the British Museum. He was a part-time lecturer in botanical pharmacology at St Thomas's hospital, London, and co-author to Robert Bentley (1821–1893) of one of the most beautifully illustrated works on the subject, the four-volume *Medicinal Plants* (1875–1880), embellished with 306 hand-coloured plates. Prior to his appointment to Peradeniya at the age of 36, he had also served for many years as editor of *Journal of Botany*. Trimen's brother, Roland (1840–1916), also an FRS, served in the South African civil service. He was a competent lepidopterist and went on to become curator of

the South African Museum in 1876. Roland was a friend of Charles Darwin and conducted an extensive correspondence with him on the orchids of South Africa, 1863–1877.

Building on Thwaites's accomplishments, Trimen worked to put the Gardens on a more scientific footing, focusing on research on a variety of crops already in cultivation, developing the herbarium and its collection of drawings, and undertaking even more intensive field exploration than Thwaites had. He was also among the first botanists (Trimen, 1885a) to seek to explain the geographic affinities of the Sri Lankan flowering plants, having observed the remarkable similarities between what are now considered the Gondwanan floras. Perhaps equally as insightful was his observation that the menacing spread of invasive alien species was due not merely to the introduction of such species to Sri Lanka: "It is the clearing of land for cultivation that gives these alien plants their opportunity. A country naturally covered with forest has no native species able to compete with these foreign inhabitants of open country and plains, which, when once introduced, are thus able to spread without hindrance."

Trimen also noted the disjunct distributions of several plant groups between Sri Lanka and southern India on the one hand, and Sri Lanka and Southeast Asia on the other, but was unable to explain this (as indeed every biogeographer since has been). In 1888, he published his *Hortus Zeylanicus: A classified list of the Plants… growing in the Royal Botanic Gardens, Pérádeniya.* This slight work was hardly suggestive of his *magnum opus, A handbook to the flora of Ceylon,* that was in the making. Sadly, Trimen was unable to complete work on the *Handbook* by the time of his death in 1896 (prior to which he suffered for some years from a disabling illness), and though publication of the first three parts took place in 1893–1895, the final two of the five parts had to be completed in 1898–1900 by J. D. Hooker, who had in 1849 declined the position of Superintendent in favour of Thwaites. A *Supplement* (Part 6) was eventually published in 1931 by Arthur Hugh Garfit Alston (1902–1958). For reasons of economy, only 100 of the Alwis collection of drawings were published (between 1893–1898) as coloured plates to accompany the text and an illustrated flora of the island is yet wanting.

Henry Trimen (1843–1896),

While Trimen was by far the most productive systematist to have worked in Sri Lanka, it was Gardner, Thwaites and the de Alwises who had paved the way for his success (a fact he never failed to acknowledge). Trimen was, however, himself and indefatigable worker, taking the trouble personally to review the founder works on Sri Lankan botany, including the Hermann Herbarium (which he annotated in its entirety), in preparing for the *Handbook.*

In 1892–93 Trimen was host to John Bretland Farmer (5 April, 1865–26 January, 1944),

Plates from Henry Trimen's *A handbook to the flora of Ceylon* (1893–1900) drawn by the de Alwis Seneviratne family: clockwise from top left, *Sonerila hirsutula* (*del.* Harmanis de Alwis), *Barleria arnottiana* (*del.* George de Alwis), *Arundinaria densifolia* and *Vanilla moonii* (*del.* William de Alwis).

Plates from Henry Trimen's *A handbook to the flora of Ceylon* (1893–1900) drawn by the de Alwis Seneviratne family: left, *Crotalaria walkeri*; right, *Cassia auiculata*.

a youthful Assistant Professor of Botany at the Royal College of Science (now incorporated in Imperial College), London. Farmer's visit to Peradeniya, and especially his tour of the rubber plantations then taking root in Sri Lanka's wet-zone lowlands, were of much influence in the later linking of botany with agriculture in the university curricula of the United Kingdom. Until then, botany had been considered a 'pure science', with agriculture a distant applied field. Farmer recognized that the vast monocultures on crops such as tea and rubber in the British Empire risked sudden collapse (as had been the case with coffee) unless the principles of botany, entomology, mycology and the like were incorporated into the university curriculum, where he sought to establish a new breed of botanists who would be of value also to agriculture. Farmer also took time off to botanise while at Peradeniya, discovering a new species and genus of water plant in the Mahaweli River a short distance downstream of the Gardens: this was subsequently named *Farmeria metzgeroides* in his honour by J. C. Willis. Shortly after his return to England Farmer was made a full professor (1895–1929) and later knighted for his services to education, botany and agriculture.

Following Trimen's death in 1896, John Christopher Willis (20 February, 1868–21 March, 1958), an assistant at the Botany Department of Glasgow University, took over as Director of the Gardens. Educated at University College, Liverpool and at Cambridge, Willis served briefly as an assistant in botany

MARIANNE NORTH

Born in Hastings, England, on 24 October, 1830, Marianne North was the daughter of a wealthy Sussex landowner and member of parliament, a relative of Frederick North (1766–1827), who was from 1798–1805 the British governor of Sri Lanka. As was the custom of the time, Marianne received only a basic education, but even in her early years showed a predilection for watercolour painting. When her mother died in 1855, Marianne took seriously to flower painting, an occupation she enjoyed also on tours of Europe, the Middle East and North Africa she undertook with her father.

Marianne was devastated by her father's death in 1869. Bestowed with ample means, she sold her house in Hastings and took full time to botanical oil painting, to which medium she had transferred a few years previously. She then began a series of overseas tours in search of plants and flowers to paint. Having started in Sicily, she later went to North America, Brazil and Japan (*via* the Pacific). *En route* to England, she stopped in Sarawak (where she discovered and painted the largest known pitcher plant, subsequently named *Nepenthes northiana* in her honour) and Singapore, and then made her way to Sri Lanka (North, 1980; Ponsonby, 1996).

Strangely for a Victorian woman, North was comfortable travelling independently to foreign lands, occasionally with a companion but often alone, making no secret of the fact that she preferred the company of "less civilized" people. Her family background was such, however, that she was usually able to secure letters of introduction to influential people in the countries she visited, which must have made her tours safer, if not merely more convenient.

So it was also when *Amazon*, the ship on which she arrived in "a good cabin but with unpleasant people", docked at Galle in 1876. She stayed initially for a week at the Grand Oriental Hotel, venturing out on sightseeing tours each morning. Despite having travelled widely in the tropics, she was amazed by the vast extents of coconut palms everywhere along the coast: "I do not think I knew what cocoa-nuts were until I saw those at Ceylon; they are the weed of weeds, and grow on the actual sea-sand" (North, 1992).

Courtesy of Royal Botanic Gardens, Kew

Marianne North, 1830–1890.

"After eight days of slow stewing, I started in an open carriage (the coach) for Colombo with two young Oxford men for companions, thoroughly nice fellows, just come from China and Japan. The road was most interesting all the way, near the beautiful shore or through swamps full of pandanus and other strange plants, with perpetual villages. I much missed the neat mat and bamboo houses of Java. In Ceylon they were mud-hovels, and everything else was less neat, the people lazier, but the little bullock-carts were very pretty. There were plenty of flowers, many of those I remembered having seen in Jamaica.

"Colombo is most unattractive, but cooler than Galle. All its houses seemed in process of being either blown up or pulled down. My hotel had 'temporary' actually printed on the bills."

The Marianne North Gallery at the Royal Botanic Gardens, Kew. The vertical planks on the panel beneath the paintings represent 246 species of wood collected by North in the course of her travels.

North brought letters of introduction to William Gregory (*q.v.*), the British governor, and upon announcing her arrival in Colombo, was promptly invited to breakfast. Gregory arranged a special carriage on the train to Kandy (but not before North was entertained to the spectacle of his pet mongoose killing a snake). At Kandy, having left her luggage at her hotel, she proceeded to Peradeniya, where she called on Thwaites.

"I found the dear old gentleman delighted to see me; and, in spite of the drizzling rain, we had a charming walk round the gardens for two hours. He had planted half the trees himself, and had seldom been out of it for forty years, steadily refusing the cut vistas, or make riband-borders and other inventions of the modern gardener. The trees were massed together most picturesquely, with creepers growing over them in a natural and enchanting tangle. The bamboos were the finest I ever saw, particularly those of Abyssinia, a tall green variety 60 or 100 feet high. The river wound all round the garden, making it one of the choicest spots on earth. Mr Thwaites showed me also his exquisite collection of butterflies, and promised to give me some of his spare ones. He kept that promise most generously; he never said anything he didn't mean, and detested everything false. He was one of the most perfect gentlemen I have ever known, and I longed to be able to stay a while to rest and paint near him and his beautiful garden."

While North was at Peradeniya, Governor Gregory visited Kandy, and both Thwaites and she were invited to dine and sleep over at the Pavilion, the governor's mansion in the hill capital. "The gardens were fine, but the house, from long disuse, looked very comfortless, as its master had not cared to live there since his wife's death [see p. 101]. I was put into the huge state-rooms the Prince of Wales had occupied last. His Excellency showed me in, and looked himself to see if they had put my sheets on the bed, for nobody was there to be responsible but the gardener. I felt like a sparrow who had by a mistake got into an eagle's nest, it was such a monstrous place, with one of those odd bunches of flowers gardeners make all over the world, on the table—a dahlia in the middle, surrounded by gardenias, then marigolds, geraniums, roses and heliotrope."

Courtesy of Royal Botanic Gardens, Kew

The Ceylon pitcher plant, *Nepenthes distillatoria*, with Banded Peacock butterflies, *Papilio crino,* by Marianne North.

Overleaf: "Talipot palm in flower at the entrance to the Royal Botanic Gardens, Peradeniya", by Marianne North. The man with a butterfly net in the background, to the right of the gate-post, could be G. H. K. Thwaites, the garden's director, who North noted was a keen collector of butterflies.

Courtesy of Royal Botanic Gardens, Kew

Thwaites and North then joined Gregory on his special train to Colombo, and she was again prevailed upon to be the governor's guest. She thereafter took up an invitation to stay with Julia Cameron, who had abandoned her husband, Charles Hay Cameron, and moved to an estate on the banks of the Kalu Ganga (river) at Kalutara, Sri Lanka to be near her sons. "Their house stood on a small hill, jutting out into the great river which ran into the sea a quarter of a mile below the house. It was surrounded by cocoa-nuts, casuarinas, mangoes, and bread-fruit trees; tame rabbits, squirrels, and mainah-birds ran in and out without the slightest fear, while a beautiful tame stag guarded the entrance; monkeys with grey whiskers, and all sorts of fowls, were outside."

Courtesy of Royal Botanic Gardens, Kew

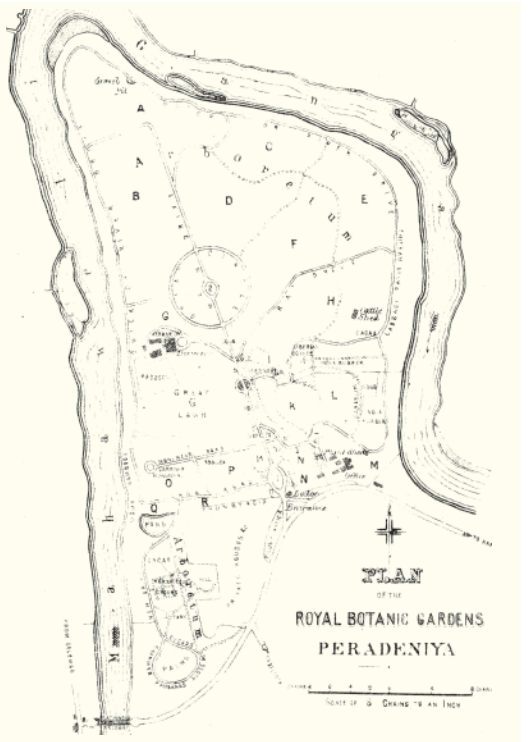
"Jak fruit, Singapore", by Marianne North. The endemic *Acavus phoenix* snail is a giveaway that the painting was actually executed in Sri Lanka and not in Singapore (Naggs and Raheem, 2005).

An accomplished photographer, Cameron decided she would photograph North, thereby subjecting the latter to an ordeal she would not easily forget: "and for three days she kept herself in a fever of excitement about it, but the results have not been approved of at home since. She dressed me up in flowing draperies of cashmere wool, let down my hair, and made me stand with spiky cocoa-nut branches running into my head, the noonday sun's rays dodging my eyes between the leaves as the slight breeze moved them, and told me to look perfectly natural (with a thermometer standing at 96°)! She then tried me with a background of breadfruit leaves and fruit, nailed flat against a window shutter, and told *them* to look natural, but both failed; and though she wasted twelve plates, and an enormous amount of trouble, it was all in vain, she could get only a perfectly uninteresting and commonplace person on her glasses, which refused to flatter."

Directly from Kalutara, North left Sri Lanka also via Galle, on the *Scindh*, on 24 January 1877. She took with her dozens of oil paintings of plants and landscapes she had executed while in the island.

In 1880, tiring of the steady stream of visitors wishing to see her paintings at her apartment in London, North approached Sir Joseph Hooker with a request that she fund a gallery for the collection in the Royal Botanic Gardens at Kew. With work on the gallery under way, she left on a tour of Australia and New Zealand, going on to Hawaii in 1881. The gallery, which houses 832 of her oil paintings from around the world (in which 727 genera and some 1,000 species are represented), opened in 1882. Also displayed in the gallery are specimens of wood from 246 species of trees, collected by North on her travels. With her paintings safely on display, she then left for South Africa in 1882, to the Seychelles in 1883 and Chile the following year.

On her return she retired to a country house in Gloucestershire, where she wrote her memoirs, *Recollections of a Happy Life* (1892), published in two volumes by her sister, Catherine Symonds, who in 1893 contributed an addendum volume of her own titled *Further Recollections of a Happy Life*. Marianne died on 30 August, 1890. She was 59 years old.



REGULATIONS.

1. It is strictly forbidden to gather flowers, fruits or seeds, or to damage in any way the trees, shrubs, and other plants, or to deface the labels. Visitors should remember that the Gardens and their contents are for the enjoyment and instruction of all.

2. Loitering about the gate is not permitted, but carriages may wait there.

3. All cattle found in the Gardens will be impounded, and their owners proceeded against as the law provides.

4. No firearms are allowed in the Gardens, nor is fishing permitted in the pond.

The gate-keepers are instructed to see that these regulations are strictly observed, and to take the names and addresses of all persons infringing the same.

Carriage Hire.—The Gardens being within the Municipal limits, hire from and to Kandy is due merely in accordance with the usual rate by time.

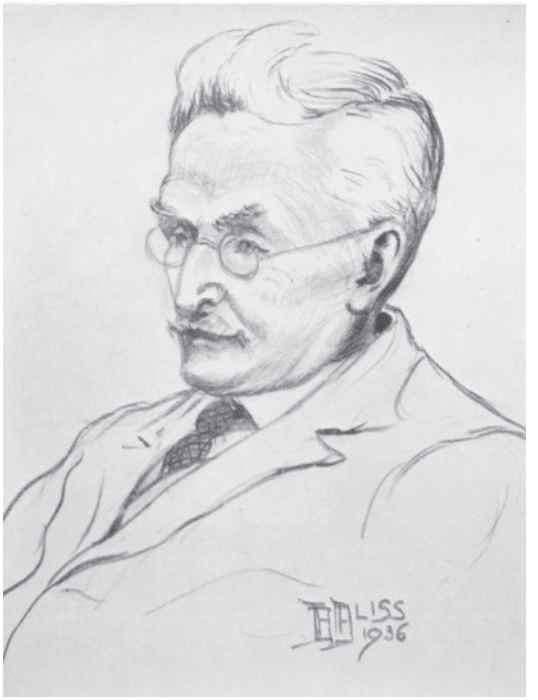
In addition to swelling the Gardens' scientific output, Trimen went to great pains to popularize their public appeal, publishing at intervals, from 1883 onwards, a *Hand-guide to the Royal Botanic Gardens, Pérádeniya,* including a map and a set of strictly enforced rules for visitors. By 1885, he was able to boast that the Gardens had an inventory of 2,500 species of plants, many of which were endemic to the island, together with every indigenous species of palm.

at the University of Glasgow before being offered the directorship of Peradeniya, at just 28 years of age. During his 15-year tenure at the gardens, he focused mainly on tea research, the disastrous blight that laid waste Sri Lanka's coffee industry in the 1860s being yet a recent memory.

Working prior to the age of computers, Willis had a facility for organizing large volumes of information with remarkable ease and speed, as evidenced by his widely-acclaimed *A manual and dictionary of the flowering plants and ferns* (1897), which reached its eighth edition in 1973. In this were listed all plant genera coined from1753 onwards (together with changes made since) and families since 1789. An arguably more complex but sadly less celebrated feat of his was *The tube-bus guide to London* (1928), in which he cross-referenced the timetables for the two modes of transport, enabling the user to plan journeys involving both through the use of a single timetable.

He was also an avid explorer (botanising also in the Maldive Islands), with a special interest in the endemic floras of mountaintops (Willis, 1906, 1908, 1914): his reports on the endemic plants of Ritigala and Namunukula mountains broke new ground. Willis was also the first botanist to note the remarkable incidence of microendemism in the island (Willis, 1915; see discussion by Ashton & Gunatilleke, 1987: 275–277), from which he developed and tenaciously defended his theories of 'age and area' and evolution by 'kaleidoscopic mutation' as opposed to natural selection (Willis, 1942) (see box: pp. 88–89).

An accident in 1905 resulted in Willis suffering a vision impairment for the remainder of his life, preventing him from undertaking further field work and restricting him to working mainly from the literature. That did not stop him, however, from documenting his extensive experience of travel in the island in *Ceylon: a handbook for the resident and the trav-*



J. C. Willis (1868–1958).

Hugh Fraser Macmillan (1869–1958).

eller (1907). In later life Willis continued to defend and expand on his Age and Area hypothesis, most notably in the books *The course of evolution by differentiation or divergent mutation rather than by selection* (1940) and *The birth and spread of plants* (1949).

Meanwhile, Hugh Fraser Macmillan (4 June, 1869–19 November, 1958) took over as Curator of the Gardens in 1895, and was responsible for the maintenance of the Gardens themselves (Macmillan's *Handbook of tropical gardening and planting* was to become a best-seller, staying almost continuously in print and running into six editions between 1910 and 1991; see also Barlow *et al*., 1991). Willis resigned in 1911 in protest at the Gardens being placed under the Department of Agriculture and took up a job as Director of the botanic garden at Rio de Janeiro the following year, a position he held until 1915. While in Sri Lanka, he founded *Annals of the Royal Botanic Gardens, Peradeniya,* the first number of which was issued on 27 June 1901.

The resignations of Willis and Macmillan did not prevent the government from placing the Gardens under the Department of Agriculture. In 1912, Robert Nunez Lyne (8 August, 1864–21 June, 1961), who had previously been Director of Agriculture in Zanzibar, was appointed to the same post in Sri Lanka, with oversight of the gardens. On his retirement in 1916, he was succeeded by Frank Arthur Stockdale (24 June, 1883–13 August, 1949), a former Director of Agriculture of Mauritius. The decline of botany in the gardens, which were now seen purely as a venue for recreation, was swift and not reversed until the Flora of Ceylon project got underway in the late 1960s. Then, as if to reward that success, in 2006 the Sri Lankan government once more restored the Gardens' autonomy by creating a Department of National Botanic Gar-

J. C. WILLIS AND 'AGE AND AREA'

The publication of Trimen's (1893–1900) *Handbook to the flora of Ceylon* provided his successors with opportunities for the first time to make statistical analyses of the island's flowering plants. Trimen (1885a) himself made a first attempt at this, remarking on the curious distributions of 108 Sri Lankan species in 86 genera that showed greater affinities to the floras of Southeast Asia, Madagascar, Mauritius and the Mascarene Islands, than to those in neighbouring India. He also drew attention to the fact that of the 2,729 native plants then recognized in the island, as many as 19 genera and 800 species were endemic. Given that continental drift was then unknown, as were also Earth's climatic history and terrestrial connections during glacial sea-level low-stands, Trimen was at a loss to explain the observed disjunctions except by postulating ancient land bridges (which had been posited also by Edward Forbes in 1846 and, more relevantly to the Gondwanan context, by William Blanford in 1876), for which there was, of course, no evidence at the time.

When John Christopher Willis took over as Director of the Peradeniya Gardens in 1896, he found in Trimen's *Handbook* a rich resource of distributional data, grist to the mill of his analytical mind. Willis was fascinated by endemism, especially the remarkable incidence of 'micro-endemics', often restricted to a single site such as a mountaintop, in Sri Lanka (Willis, 1906 [Ritigala], 1908 [hilltop floras], 1911 [Namunukula]). He sought to address the question, were these relicts of species that had previously enjoyed wider distributions, or had they evolved *in situ*?

In seeking to explain the occurrence of micro-endemic species in Sri Lanka, Willis rejected the possibility that the ranges of such species might be restricted by habitat specialization (e.g., climate, rainfall, soil) or by limited ability to disperse. Given that many micro-endemic species occur in communities that included non-endemic congeners, he concluded that the former were incipient species that had evolved only recently. This in turn led him to conclude that widespread species (and by extension, taxa) were evolutionarily older than ones with more restricted ranges.

Willis hinted at this conclusion in his 1907 paper in *Annals of the Royal Botanic Gardens, Peradeniya,* but was evidently prompted to articulate it more fully in a paper he read to the Royal Society on 10 December, 1914, after Sinnott and Bailey (1914), in an early study of plant phylogeny, had suggested that herbaceous plants were of more recent origin than woody ones, which they treated as primitive. Having analyzed the composition of a number of temperate and tropical floras, they noted that "There is a great preponderance of herbs in temperate regions and of woody plants in the tropics." They concluded from this that "herbaceous vegetation, most richly developed in the great land-mass of the north temperate zone, has spread thence over most of the globe." They went on to add: "The endemic plants in a flora are usually to be regarded as its most ancient element... endemic trees or shrubs are almost always very ancient."

Willis (1915) proposed his theory not as a direct response to Sinnott and Bailey (1914), but as an original thesis based on an analysis of Trimen's *Handbook.* In this, Trimen had not only mentioned which species were endemic, but also provided an index of rarity, on a scale of 1–6. Willis was quick to observe in these data that "The rarest plants in Ceylon are the local endemics, the next most rare those also common to Peninsular India, and the commonest those of wider distribution... From these interesting figures", he continued,

> one may conclude that the local endemic species have not been developed in any kind of advantageous response to local conditions. They are much rarer than those species which are also common to Peninsular India, and these again than those of wider distribution..."
>
> The second conclusion drawn is that on the average, the commonness of a species depends upon its age from the time of its arrival in, or evolution in, the country. The commonness of any individual species will, of course, also depend upon its degree of adaptation to local conditions, and upon many things that can only be regarded as chance, such as the sudden appearance of new factors, like diseases, etc., in the problem. In other words, on the average, species are developed quite indifferently to local conditions, though it is possible that they may be developed because of these conditions.

Thus came into being Willis's theory of Age and Area, the proposition that wide-ranging species are more ancient than narrow-ranging ones. The theory, while accepting the *process* of evolution, rejected Darwin's proposition that the *mechanism* involved was natural selection, mainly on the additional grounds that the accumulation of infinitesimally small variations to create distinctive 'Linnean' species would take much longer than geological time allowed (Willis, 1907). Wrote Willis: "Nearly seventy years ago, Lyell [1853] said, 'Might not the births of new species, like the deaths of old ones, be sudden?' and it appears to me... one can hardly arrive at any other conclusion" (Willis, 1922). Willis did not restrict the single-step origin of taxa to species: he claimed that "a single mutation, usually very divergent from the parent form, may give rise, at one step (not gradually as under Darwinism) to a new form, of family, generic, specific or varietal rank" (Willis, 1949). Willis (1942) had given this process the name 'kaleidoscopic mutation', the allusion to the kaleidoscope signifying that with each turn of the spindle, a set of dramatically different shapes appears based, however, on a combination of standard templates.

An early supporter of the Age and Area theory was Hugo Marie de Vries (1848–1935), a Dutch botanist who, though noted for rediscovering (together with Carl Correns and Erich von Tschermak) Mendel's laws of heredity in 1900, challenged Darwin's gradual evolution of species and posited a Mutation Theory that claimed species to arise through single mutations. De Vries (1916), having tested Willis's arithmetic concluded,

> It is obvious that some general law must be underlying these phenomena... If the endemic species had originated by natural selection of infinitesimal steps, and in response to the local conditions, which are obviously the only conditions that matter when the species first appears, they must have been, from this very origin, better adapted to these conditions than their parent species. According to the theory of natural selection it would follow that they must surpass their forerunners in the struggle for life and soon spread to a higher degree of commonness. But... the reverse is true.

Opposition to Willis, however, was quick to galvanize, principally in the form of Henry Nicholas Ridley (1855–1956) who, in a 24-page critique in *Annals of Botany*, systematically demolished Willis's arguments. Given that Willis's original (1915) paper was based largely on the data in Trimen's *Handbook*, Ridley questioned, for example, Trimen's degrees of rarity, correctly pointing out that because Trimen's sampling was biased towards the favourite locations of his collectors, conclusions on abundance and distribution would necessarily be biased.

Willis, however, was not one to quit lightly. Not only did he tenaciously cling to his views, but continued to expand on them, deftly placing special conditions in the way of his detractors' arguments, making it impossible to test his hypothesis. In all, between 1915 and his death in 1958, he published some eighteen papers and three books substantially on Age and Area.

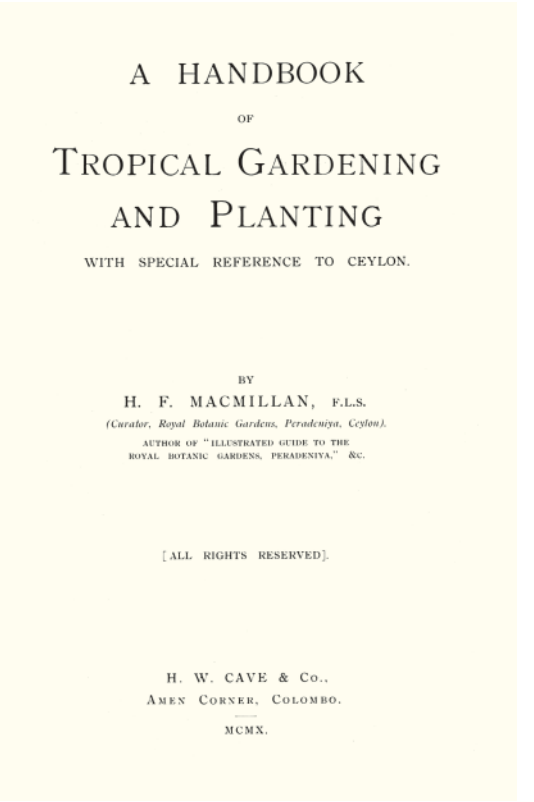
Although kaleidoscopic mutation has, of course, been universally rejected, the determinants of rarity and the relationship between geographic range-size and evolutionary age continue to be important areas of study. Even some of its severest critics grudgingly admitted that Age and Area held considerable intuitive appeal: its conclusions appeared almost obvious; but they were nonetheless untrue.

Willis was adept at persuasive argument, cleverly picking only ripe cherries to support his cause, to articulate which he was able to coin catchy phrases like Age and Area, and Size and Space in an almost Jane-Austenian way. His theory is more likely to be remembered, however, for the debate it aroused and the research it caused to be done in order to confirm and refute it, much of which was beneficial (almost 100 papers addressing the issue have been published since 1915). The widespread use of his label 'Age and Area' in the current ecological literature shows that it is an idea that is still alive, though of course its context has been transformed.

dens with the incumbent director of the Peradeniya Gardens at its head.

The task of exploring the angiosperm flora had been in large measure completed by Trimen, though a trickle of new taxa continued to be described. In 1968, the Smithsonian Institution and Sri Lanka Department of Agriculture joined forces to publish a revised edition of Trimen's monumental work under the joint editorship of Maliyasena Dhammadasa Dassanayake (1921–) and Francis Raymond Fosberg (1908–1993), with William Derek Clayton (1926–) replacing Fosberg following the latter's death. Volume 1 of *A revised handbook to the flora of Ceylon* appeared in 1980, the final (15th) volume being issued in 2006. In all, the flowering-plant portion of the work, comprising some 6,360 pages of volumes 1–14 (plus an index volume), was written by 77 authors representing a dozen countries. Sadly, again for reasons of economy, the work was not accompanied by coloured illustrations of the plants. In 2006, a 15th volume, on the ferns, was issued in two parts, edited by Monika Shaffer-Fehre.

The collaborations between the Smithsonian Institution on the one hand, and Peradeniya University and the Department of Agriculture (National Herbarium) on the other, led to a new phase of botanical exploration which in effect doubled the National Herbarium's angiosperm accessions: some 50,000 new flowering-plant specimens were added to the collection (M. D. Dassanayake, *in litt.*). The authors revising the taxonomy of the various groups of plants also updated and annotated the herbarium's specimen sheets, greatly enhancing knowledge of lant distributions in the country. In addition to this, Antony Harold Magdon Jayasuriya (1944–), in the course of the National Conservation Review (1996) and other expeditions, added a further *ca* 15,000 specimens to the collection based, for the first time, on an objective sampling methodology.


A HANDBOOK
OF
TROPICAL GARDENING
AND PLANTING
WITH SPECIAL REFERENCE TO CEYLON.
BY
H. F. MACMILLAN, F.L.S.
(Curator, Royal Botanic Gardens, Peradeniya, Ceylon).
AUTHOR OF "ILLUSTRATED GUIDE TO THE ROYAL BOTANIC GARDENS, PERADENIYA," &c.
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H. W. CAVE & Co.,
AMEN CORNER, COLOMBO.
MCMX.

Hugh Fraser Macmillan's classic 1910 *Tropical gardening and planting*, now in its sixth edition, has been a favourite with tropical horticulturists for a century.

One of the crops tried in the Sri Lankan highlands, even as coffee failed, was camphor, a species of *Cinnamomum* (Macmillan, 1910). Macmillan almost always included a man, as shown here, to serve as a 'scale bar' in his photographs.

Courtesy of Dr Malik Fernando

Dorothy Fernando (1907–1981).

Dorothy Fernando

Dorothy Beatrice Helena Fernando née Dias (18 September, 1907–3 November, 1981), was born to a wealthy family of plantation owners at Panadura, a coastal town south of Colombo. She schooled at Bishop's College, Colombo and Malvern Girls' School, Worcestershire, England. Fernando spent her holidays largely at the family's holiday homes amidst tea estates in Sri Lanka's highlands, at Hatton and Nuwara Eliya, where she developed her love for natural history. In the 1940s Fernando, a keen watercolour artist from her young years, was invited by Ernest Soysa, her brother-in-law, to paint a large series of Sri Lankan orchids in bloom, to accompany a set of articles he was writing on this flora. So taken up with this challenge was she that her husband provided her with the means to travel widely within the island, painting wild flowers. In 1954 she published a collection of these in her book, *Wild flowers of Ceylon* (her original drawings are archived at the Linnean Society of London). In 1969 Fernando began an ambitious but never completed project to paint the Sri Lankan orchids in flower, preferring to travel (accompanied by her son, Malik) into the forest in search of plants in bloom, which she painted *in situ*. In all, she had painted more than 100 species, all of them life-size, at the time of her death in 1981. She also made a large number of drawings of insects, including life-history studies of Sri Lankan butterflies.

Thomas Petch (1870–1948).

In 1904 Thomas Petch (11 March, 1870–24 December, 1948) was appointed Mycologist to the Royal Botanic Gardens at Peradeniya (later to the Department of Agriculture). A graduate of the University of London, Petch had worked as a schoolteacher in Norfolk, during which time he had taken seriously to mycology. Although charged primarily with devising means to protect Sri Lanka's fast-growing rubber plantations from fungal pathogens (a subject on which he published extensively), Petch took time off to make extensive collections of fungi in the island and in 1950 published *Fungi of Ceylon*, a pioneering work on this flora, of which Guy Richard Bisby (17 August, 1889–3 September, 1958), Mycologist at the Commonwealth Mycological Institute at Kew, was co-author.

Petch's work in Sri Lanka gained him early recognition, and he was elected President of the British Mycological Society in 1920. After serving at Peradeniya for two decades, Petch was in 1925 appointed Director of the Tea Research Institute at Talawakelle (for which he had laid the ground in his 1923 monograph, *The diseases of the tea bush*), a post he held for three years, retiring aged 58 in 1928. He then returned to

Courtesy of Dr Malik Fernando

Pitcher orchid, *Acanthephippium bicolor*, by Dorothy Fernando.

England, where he continued to work on fungi, becoming President of the Yorkshire Naturalists' Union in 1931.

No discussion of the Sri Lankan flora could be complete without mention of Richard Henry Beddome (1830–1911), whose work on the ferns of India and Sri Lanka (Beddome, 1863; 1865–68; 1876) remains in use even today. Beddome came to India as an officer in the Madras Infantry of the Indian Army in 1848, transferring to the newly-created Forest Department as Inspector of Forests in 1857. He was a passionate advocate of forest conservation: his 1869–73 *Flora sylvatica for southern India* (including Sri Lanka), was the first comprehensively illustrated guide to the identification of the trees and shrubs of the region.

Also important was Ethelbert Blatter's (15 December, 1877–26 May, 1934) *Palms of British India and Ceylon* (1926). A Swiss-born Jesuit priest, Blatter collected extensively throughout India while lecturing in botany at St. Xavier's College, Mumbai.

A couple of botanical artists of significance outside of the Royal Botanic Gardens, Peradeniya, were Thomas Edward Tucker Bond and his wife Jessie Bond, a scientist (PhD, DSc) attached to the Tea Research Institute of Ceylon, at St. Coombs, Talawakelle, in the 1940s, wrote (and together with his wife, illustrated with line drawings) *Wild flowers of the Ceylon hills* (1953). In the late 1940s he transferred to the Botany Department of the University of Sheffield, and by 1957 to the Horticultural Science Laboratories at Bracken Hill, Leigh Woods, Bristol and in 1965 to the Research Station, Long Ashton, Bristol, retiring in 1980 to Abbots Leigh.

Exploration of the Fauna

Indian paradise flycatcher, *Terpsiphone paradisi*, illustrated in George Edwards' *Gleanings of Natural History* (1758–1764). The note below the drawing reads, "A bird from the island of Ceylon, drawn from nature of the size of life by Geo. Edwards. April 4, 1760. *Vid.* Knox's Hist: of Ceylon in the East Indies. London. 1681. Page. 27."

A chevrotain (*Moschiola* sp.), by Eudelin de Jonville, drawn in Sri Lanka *ca* 1800.

Exploration of the Fauna

Traditional medicine required its practitioners to be intimately familiar with plants of medicinal value, and therefore to be able to identify these and distinguish them one from another. Hundreds of Sri Lankan plant species thus have local names and are readily identified by native pharmacists. In most cases, medicinal or other properties are attributed to named plants; plants lacking names, by and large, are those whose useful properties were unknown. Thus it was that Paul Hermann was able to document the Sinhala names for almost all of the ~1,000 species of plants he collected in Sri Lanka in 1672–1679 (see p. 46).

With the exception of the larger mammals and commoner birds and snakes, however, such has not usually been the case with the island's fauna. With rare exceptions, most species of amphibians, lizards and invertebrates have historically lacked local names, though many recent authors have been at pains to coin names for vernacular use. (A lack of names for individual species should not be interpreted to mean, however, that there was a lack of awareness that such species exist: it simply was not useful to have names for organisms that one did not need to refer to in everyday use.)

While a knowledge of botany was essential for practitioners of traditional medicine, an intimate acquaintance with zoology was not, unless relevant to medicine, e.g., in snakebite. As such, little traditional zoological information has been documented, except rarely in cases such as the anonymous ola (palm)-leaf manuscript dating at least to 1812 on the natural history of fishes and amphibians in the Blacker Library of Zoology at McGill University, Montreal (Wood, 1931).

The Dutch exploration of the Sri Lankan flora for medicinal plants was largely futile save for a handful of well-known exceptions such as the neem, *Azadirachta indica*, even then widely cultivated in Asia for its numerous medicinal uses.

With their occupation of the island at the end of the eighteenth century, the initial Brit-

ish interest was in horticulture, both for the purpose of introducing crops of commercial value to Sri Lanka, and for preparing plants for export to such gardens in England or elsewhere in the colonies; hence the focus on the botanic garden. That these gardens became a centre for exploration and research was largely a secondary product.

French connections

Zoology, however, had no such advantage. Apart from the pearl fishery, the only initiative for zoological exploration of the island stemmed from the establishment of the Colombo Museum in 1877. There were no collecting expeditions funded by the British Government, and little encouragement of such activity even by the colonial administration. By contrast, despite their modest colonial holdings in South Asia, the French were far less complacent, a fact that did not escape the geologist John McClelland, who in 1844 bewailed the British establishment's indifference to natural-history exploration, which was then in India (and Sri Lanka) largely the province of amateurs, albeit largely dedicated and competent ones. Referring to Charles Belanger's (1838) *Voyage aux Indes Orientales* he remarked, "We wish our own Government would take a lesson from the French, who seeing the interest of science neglected in the colonies of other rival nations, with an enlightened policy peculiar to the French, dispatched their own philosophers to supply desiderata."

In 1816, Jean-Baptiste-Louis-Claude-Théodore Leschenault de la Tour (1773–1826) arrived in Pondicherry (then a French colony, now in Tamil Nadu State, India), to take charge of the Royal Botanic Gardens there. Leschenault collected extensively, travelling widely and making collections throughout India, finally returning to France in 1826. He visited Sri Lanka in 1820–21, making collections of both plants and animals, and also writing an account of the agricultural produce of the island, especially cinnamon.

At about the same time, important collections were made in Sri Lanka by other French explorers, including August-Adolphe-Marc Reynaud (1804–1872) and Pierre Sonnerat (1748–1814) (Bauchot *et al*., 1990). The resulting collections were sent to the Museum National d'Histoire Naturelle in Paris, where Georges Cuvier, Étienne Geoffroy Saint-Hilaire (1772–1844) and Henri Marie Ducrotay de Blainville (1777–1850) were to publish names and descriptions of many of them (Kinnear, 1952a,b).

Societies and periodicals

Much of the mid-19th century research on the zoology of Sri Lanka was published in British journals, principally *Annals and Magazine of Natural History* and *Journal of the Linnean Society of London.* The *Journal of the Bombay Natural History Society* began publication in 1886, providing an avenue for dissemination of the results of research taking place in the subcontinent. In Sri Lanka, only a handful of local societies published periodicals that entertained articles on zoological discovery.

The earliest among these was the Ceylon Agricultural and Literary Society, established on 11 December, 1820, with the objects of directing attention to Sri Lanka's geography, geology and mineralogy, its botany ("perhaps the richest and least exhausted of any in the world"), its fishes and its history, language and customs. The *Proceedings* of the society were published from time to time in the *Ceylon Antiquary and Literary Register.* Also active at the time was the Ceylon Improvement Society which, however, made little contribution to natural history researches.

By 1825, in addition to the Military Museum in the Fort of Colombo—in which J. W. Bennett (*q.v.*), for example, deposited the dried skins of his fish specimens—a museum had also been established in the governor's house.

The colony's capital also boasted at least three libraries: the Colombo Library, the Pettah Library and the United Services Library.

The Colombo Museum commenced in 1903 the publication of its own journal, *Spolia Zeylanica*, an unashamedly colonial title (*spolia* being Latin for 'spoils'). The frequency of *Spolia* slowed after Independence in 1948, however, and ceased in 1982, to be revived in 2002, but with little natural history content.

The Bulletin of the Ceylon Fisheries Research Station (1923–), in which many important natural history papers were published up to the 1950s, suffered much the same fate. Though its scientific content was slight, *Loris*, the journal of the Wildlife and Nature Protection Society of Sri Lanka (1936–) contains important records relevant to zoological exploration and discovery and continues to publish two issues each year. While the earlier issues of the *Ceylon Journal of Science* too, contain several important zoological contributions, the post-Independence abandonment of exploration and research is accurately reflected in the literature, a resurgence beginning only in the mid-1980s and apparently gathering pace (though again, driven largely by dilettantes), but this period is not treated in the present account.

The Ceylon Literary Society's contribution to natural history was modest, however, and the Natural History Society was established in 26 March, 1912 specifically to remedy this defect (Senadhira,1995). Recognizing that most natural history exploration and research was being done in isolation by amateurs, the Society sought to provide a forum for discussion, sharing of knowledge and (what would today be termed) networking. Centred around the Colombo Museum, it wisely chose, rather than publishing a separate journal, to support the Museum's journal, *Spolia Zeylanica.* Sadly this society too, found it difficult to sustain itself in the post-Independence period.

Two other journals of considerable importance were *The Taprobanian* (1885–), edited and produced by Hugh Neville, and *Annals of the Royal Botanic Gardens, Peradeniya* (1901–).

After a false start in 1843, the Agricultural Society was formed on 28 October, 1904, "to encourage the advances of the agricultural community by improved methods of cultivation", and flourished until its absorption into the Department of Agriculture in 1921. Among the most progressive and innovative of such associations in the island, the Agricultural Society established regional societies and also, from its second year, introduced the innovation of publishing literature in the local languages so as to be intelligible to native farmers. *The Magazine of the Ceylon Agricultural Society* was later merged with John Ferguson's *The Tropical Agriculturist* (1881–), which catered largely to a readership of planters.

On 7 February, 1845, the Ceylon Branch of the Royal Asiatic Society came into being, its objects being "to institute and promote inquiries into the history, religion, literature, arts and social conditions of the present and former inhabitants of this island, with its geology, mineralogy, its climate and meteorology, its botany and zoology" (Vanderstraaten, 1886). Though natural history was listed last among its objects, the *Journal of the Royal Asiatic Society (Ceylon Branch)* (1845–) over the years published many papers of great importance to this field, though it too, reflected the national post-Independence decline in zoological productivity. Perhaps more importantly, the Society soon after its incorporation began to accumulate a collection of historical objects, leading to growing demand for a museum. This was, however, to remain a dream until the advent of William Henry Gregory as the colony's governor in 1872.

William Gregory and the Museum

Gregory came to be a champion of the museum entirely by coincidence. Born to an influential Irish family in Galway on 12 July

The National Museum, Colombo—William Gregory's monument to the history and natural history of Sri Lanka—130 years after it was opened, in 1877.

1817, he had excelled in his early education at Harrow but dropped out of Oxford, shortly after which, in 1842, he successfully stood as member of parliament for Dublin. Despite his youth, Gregory's outstanding abilities were not long in being recognized by the government, though he refused a portfolio and remained a backbencher until he lost his seat in the election of 1847. Two years later he was appointed High Sheriff of Galway and, for a period of which he was deeply ashamed later, took (unsuccessfully) to the turf. Having lost a fortune and reformed, in 1857 he stood once more for parliament and was elected, this time from Galway.

In his second term in the Commons, Gregory once more declined high office but took a keen interest in the development of the British Museum and the National Gallery. Appointed as chair of a government committee to devise reforms of the British Museum, he steadfastly (and unsuccessfully) opposed the plan to relocate the natural history collections to the grand building in which they are housed today, in South Kensington. While Gregory was undoubtedly attracted to natural history, however, descriptions of him as an amateur entomologist are probably an exaggeration.

In 1872 Gregory solicited and obtained the governorship of Sri Lanka and married Elizabeth Temple-Bowdoin *née* Clay, a widow, shortly before his departure for Colombo. Almost immediately after taking office in March, 1872, he was urged by the Ceylon Branch of the Royal Asiatic Society, which since the early 1850s had accumulated a significant 'museum collection' that was in need of a permanent home, to establish a museum in Colombo. He eagerly accepted the challenge and was not long in persuading the colony's legislative council that Colombo should be en-

dowed with a magnificent museum (such edifices were springing up also elsewhere in the British colonies at the time). "For a comparatively small sum (considering the object in view)," he told the Council, "a museum may be constructed, which shall not be a mere random collection of miscellaneous objects, but a scientific teaching exhibition, which, by ministering to the amusement of many, may convey instruction to all who seek it."

Such rhetoric repeated *ad infinitum* helped wear down the Colonial Office's resistance to the extravagant project and funds were reluctantly voted. Work on the project commenced almost immediately, in 1873. While construction was in progress, Gregory suffered the death of his wife of just over a year: Elizabeth died, probably of dysentery, in Kandy on 28 June, 1873, and was buried in the Old Garrison Cemetery there. For his part, Gregory pursued work on the museum with undiminished zeal and as a result, the structure was up by September 1875 and opened its doors to the public on 1 January 1877. It immediately became extremely popular with the Sri Lankan population, admitting almost a hundred-thousand visitors in its very first year.

Having resigned the governorship on 8 May, 1877, Gregory returned to England and thereafter took no part in public affairs until his death on 6 March, 1892. Nevertheless, he did keep closely in contact with his successors in Sri Lanka, importantly in relation to the successful functioning of the museum (Gregory, 1894). The governor's ambitious adoption in Sri Lanka of the 'all-in-one' concept of the British Museum, with fields as diverse as natural history, archaeology, palaeontology and ethnography being housed under one roof, however, was probably a mistake. Gregory was determined that the British model should be followed. It was a model, however, that had already been widely recognized as unsatisfactory. In 1866 the Royal, Linnean and Zoological Societies, supported

Joseph Pearson (1881–1971).

by distinguished naturalists including Darwin, Wallace and Huxley, had petitioned the British government to make the British Museum's natural history section autonomous. Gregory had steadfastly opposed that move, and the Natural History museum continued to be a division of the British Museum until the British Museum Act of 1963. In Colombo, tensions between the practitioners of the various specialities would run high as the museum matured, with the division between the sciences and the arts becoming particularly trenchant. By the early 1960s the museum was in state of steady decline and has since shown little sign of recovery. Indeed, except for the work of P. E. P. Deraniyagala, its post-Independence contribution to both the sciences and the arts has, sadly, been almost negligible.

Having built the magnificent edifice, Gregory had with uncanny prescience opined that little would be achieved unless a suitable director was recruited to lead the institution. "Believing as I do that the success and utility of this institution will depend on the character and attainments of its director," he told the island's legislative council, "I shall ask you, by granting him a liberal salary, to offer an inducement to a man of high acquirements to undertake the task. Far rather would I exercise parsimony in the structure, than in the salary of the director; far rather would I have an eminent man and a plain inexpensive building, than a costly edifice and a cheap and inefficient director." The governor had thus, with remarkable prescience, put his finger on precisely the weakness that would a century hence reduce his masterpiece to a mere façade of but marginal value to the objects he sought to promote.

Zoological exploration

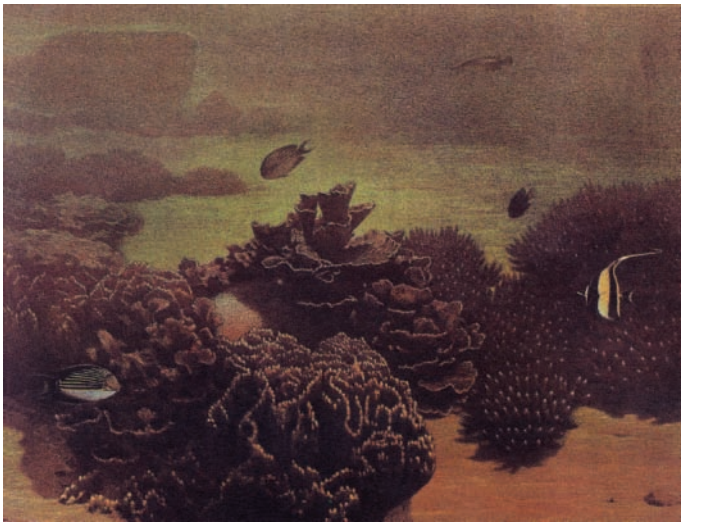
The history of scientific zoological exploration in Sri Lanka is not as easy to narrate as that of botany because zoology never had an institutional focus as botany did at the herbarium and botanic gardens at Peradeniya. With rare exceptions, zoologists (especially taxonomists) working on diverse taxa tended to work independently of one another, often relying on local collectors to send them preserved specimens. Except in the case of a handful of zoologists, most notably P. E. P. Deraniyagala (*q.v.*), the Colombo Museum (now the National Museum) failed to engender a culture of zoological exploration, especially after Independence in 1948. Another notable aspect of zoological exploration was that it was undertaken largely by amateurs (in the most beautiful sense of that word), for whom the study of natural history was a labour of love, not a profession. Working alone, or in collaboration with specialists overseas, they contributed little to the museum, and in turn, the museum had little of value to offer them and their successors. A consequence of this has been that the Sri Lankan collections of the natural history museums of Europe—especially that in London—are not only far more extensive than those of Sri Lanka's national museum, but also much better cared for. Interestingly, the National Herbarium, which from the outset followed a course of greater engagement with the local and international community of naturalists, met with far greater success in building and maintaining its collections.

It is relevant to note, however, that early zoological exploration in Sri Lanka, measured largely through description of new species in the taxonomic literature, resulted mostly from cabinets of specimens being sent to experts working overseas. The actual *exploration* involved, therefore, has gone largely undocumented, added to which is the fact that many of the taxonomists involved had but the slightest acquaintance with Sri Lanka. At the same time, much natural history exploration took place as an adjunct to other activities such as hunting. With a few important exceptions, sportsmen (many of whom published accounts of the island including cursory natural-history observations), authors of travelogues, and works that did not involve exploration or contribute to scientific heritage, such as early treatments of snakebite, are omitted from this account. Also excluded are foresters and fisheries scientists, save those who were involved in exploration and discovery.

Because of this lack of institutional accomplishment, the zoological exploration of Sri Lanka is perhaps best related biographically. As in the case of botany, it involves essentially collectors and taxonomists: interest in branches of biology such as ecology, evolution and conservation developed only relatively recently. The following account is biased towards vertebrate taxonomists and collectors: save for the *Fauna of British India* se-

ries, there have been few attempts to review entire invertebrate faunas in the island, such as Frederic Moore's (*q.v.*) *Lepidoptera of Ceylon* (1880–1881) or Karl Krombein's *Biosystematic studies*—indeed, such faunas would in most cases be too large practically to be treated in single works.

Many important workers (even relatively recent ones) are known only slightly, and much research on the history of exploration in Sri Lanka remains to be done. For example, the Entomology Library of the Natural History Museum, London, contains numerous manuscripts and drawings of Sri Lankan insects (Harvey *et al.*, 1996), e.g., typescripts by F. G. Browne (d. 01 January, 1987, on the island's scolytid beetles), little being known of the authors involved. Likewise, the entomological diaries of the microlepidopterist Thomas Bainbridge Fletcher (25 March, 1878–30 April, 1950), who visited Colombo while serving on *HMS Edgar* in the first decade of the 20th century; watercolour drawings of Sri Lankan Lepidoptera together with their larvae and food plants by Margaret Elizabeth Fountaine (16 May, 1862–21 April, 1940); and a bound volume of 29 plates of Ceylon insects and 4 plates of Kandyan costumes inscribed "Dec. 10th, 1879" gifted to the library by Rebecca Byrde, remain to be researched. Much work remains to be done with regard to exploration of the island's invertebrate faunas in general.



Itinerant illustrators such as the Austrian diplomat Freiherr von Eugen Ransonnet-Villez (1838–1926) contributed significantly to 19th-century awareness of Sri Lankan natural history. De Ransonnet's pioneering Sri Lankan underwater 'reefscapes' (above), painted using a diving bell during a visit to the island in 1864–65, now in the Naturhistorisches Museum, Vienna, were published as *Sketches of the inhabitants, animal life and vegetation of the lowlands and high mountains of Ceylon as well as of the submarine scenery near the coast...* (Vienna, 1867).

Enigmatic origins

In many cases there is almost no record of the collections made by important workers in the island, especially in the early years. For example, George Finlayson (1790–1823), surgeon-naturalist to John Crawfurd (1783–1868) in his embassy to Thailand and Cochinchina (now southern Vietnam), lived in Sri Lanka from *ca* 1816–1819. While I have found no evidence of natural-history activity by him in Sri Lanka, the India Office Library in London contains 80 zoological drawings made by him in Thailand. Similarly, much of the material collected by J. W. Bennett and E. F. Kelaart cannot now be traced.

Several early explorers are known largely from brief acknowledgements in the works of others and from inscriptions on their tombstones, such as this one at St Paul's Church, Kandy:

> "Sacred to the memory of Oliver Collett, FRMS, MCBRAS [*ca* 1867–13 June, 1902], Binoya Estate, Ambegamuwa, who departed this life on 13th of June, 1902, aged 35 years. This tablet was erected by some of his friends in Ceylon as a token of their esteem. He was a diligent student of natural history, and contributed papers on the subject of beetles to

the journals of learned societies" (Lewis, 1913).

Into this category falls also H. M. Drummond-Hay, of whom Wall (1921) wrote,

> I found his bungalow a veritable museum, stocked with specimens of every kind. He has devoted his attention more possibly to the snakes of Ceylon than to any other branch of natural history and I had the rare opportunity of examining many hundreds of specimens collected by him. Mr Drummond-Hay... has never essayed to publish the results of his own observations.

Nowhere is the adversarial relationship between the early English settlers and nature better exemplified than in the wanton slaughter of elephants, which they themselves recognized as being among the most docile of all wild animals (*ca* 1850, by Emanuel Andrasy, 1821–1891).

It is possible that he was a descendant of Henri Maurice Drummond (later Drummond-Hay, 7 June, 1814–3 January, 1896), who served with the Black Watch for 20 years, rising to the rank of Colonel. He was stationed in Corfu and Malta, based from which he made an extensive collection of Mediterranean birds which he took with him, on his retirement, to his ancestral home, Megginch Castle, in Perthshire. In 1858 H. M. Drummond-Hay was a founder (and later, President) of the British Ornithological Union. A. F. Abercromby, author of *The snakes of Ceylon* (1910), appears just as elusive.

Strachan

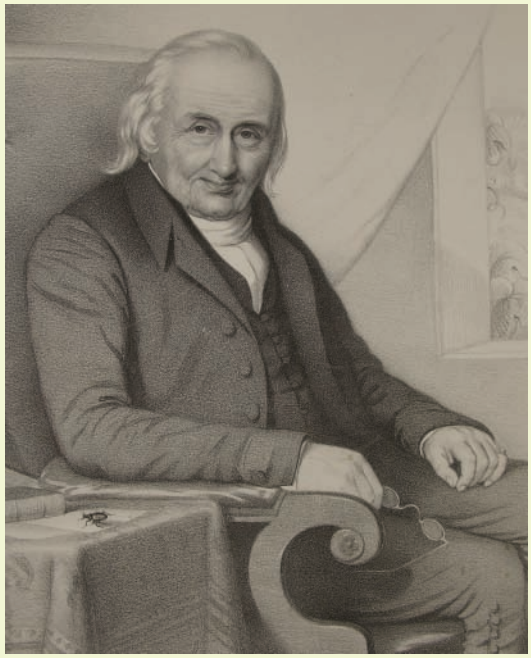
One of the most enigmatic personalities in the Dutch period was "Mr. Strachan, a physician, who lived 17 years" in Sri Lanka, and had previously been in Batavia. Strachan (a Scots name) published four short papers in *Philosophical Transactions* in 1702, including: 'An account of the taking and taming of elephants in Zeylan', 'Some observations on coral, large oysters, rubies, the growing of a sort of *Ficus Indica*, the gods of the Ceylanese, &c', and 'Observations... on the ways of catching fowl and deer, of serpents, of the ant-bear and of cinnamon'. The accounts abound with anecdotes such as this:

> "Other [elephants] are of a more savage nature, which are known by their eyes and face, having a fierce tyger-look, and will be for no service, although they be kept 10 years: such ones the King of Candie keeps for punishing of transgressors [see illustration on p. 173], for they kill all persons that come within their reach. One of them the late King of Candie (who never in all his life after the Hollanders had beat the Portuguese from Zeilan, and not performing their promise to that king, who had been a great help to the Hollanders in that war) sent to the Hollanders when I was there, in recompence for some presents, which the Hollanders had sent to move him to peace; among which presents a lyon from the Cape of Good Hope was sent, as being the king of all other beasts, but he would never let these presents come within 20 miles of his presence; the Hollanders kept the same elephant in a place by himself still tyed, being at great pains every day to bring him to the water side betwixt two tame elephants, the Hollanders intending to shew the regard they had to that kings gifts."

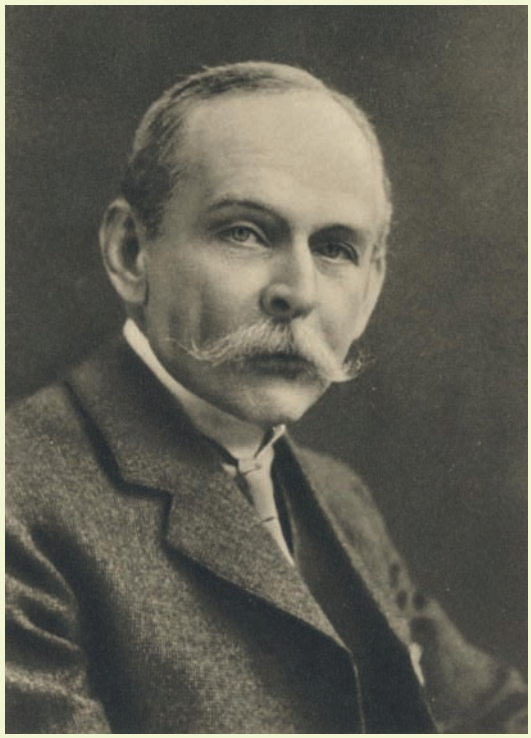
INVERTEBRATE TAXONOMISTS

Insects outnumber vertebrates by several orders of magnitude, and entomologists reflect this disproportion. A few of the better-known entomologists and other-invertebrate taxonomists are listed or portrayed here, while a great many important ones have been omitted for lack of information or photographs (see also Wijesekara and Wijesinghe, 2003). The following are some of those who were active in working on the insects and other invertebrates of Sri Lanka (*n.b.* the taxonomic groups listed after each name are only a sample: many of these individuals worked also on other taxa):

Alcock, Alfred William (23 VI 1859, Mumbai–24 III 1933, London) Carcinofauna.
Andrewes, Herbert Edward (09 XI 1863, Reading–16 XII 1950, Highgate) Coleoptera.
Barraud, Philip James (1879–1948) Diptera: Culicidae.
Beier, Max Walter Peter (06 IV 1903, Spittal an der Drau–04 VII 1979, Wien).
Bernhauer, Max (24 IX 1866, Müglitz, Mähren–14 III 1946, Wien) Coleoptera.
Bingham, Charles Thomas (16 IV 1848), India– 18 X 1908, West Kensington).
Bonadona, Paul (01 VI 1909, Marseille–26 X 1997) Coleoptera.
Bourgeois, Jules (31 V 1847, Saintes-Maries-aux-Mines–18 VII 1911, *ditto*) Coleoptera.
Brindle, Alan (11 III 1915, Nelson, Lancashire– 05 IV 2001, Burnley) Dermaptera.
Brunetti, Enrico Adelelmo (21 V 1862, London–21 I 1927, *ditto*) Diptera.
Brunner von Wattenwyl, Carl (13 VI 1823, Bern, Switzerland–24 VIII 1914, Kirchdorf, Austria).
Burr, Malcolm (06 VII 1878, Blackheath– 13 VII 1954, Istanbul) Orthoptera, Dermaptera.
Cameron, Malcolm (1873–31 X 1954, London) Coleoptera.
Cameron, Peter (1847–01 XII 1912, New Hill, Derbyshire).
Campion, Herbert (1870–24 I 1924); Odonata.
Carl, Jean (=Johann) (28 XI 1877, Schuls, Germany–07 VI 1944, Genf) Orthoptera, Myriapoda.
Chopard, Lucien (31 VIII 1885, Paris–16 XI 1971) Orthoptera.
Christophers, Samuel Rickard (27 XI 1873, Liver-



W. F. Kirby (1844–1912).



A. W. Alcock (1859–1933).

pool– 19 II 1978) medical entomology; Diptera: Culicidae.
Cockerell, Theodore Dru Alison (22 VIII 1866, Norwood, nr London– 26 I 1948, San Diego).
Distant, William Lucas (12 XI 1845–04 II 1922, Wanstead, Essex) Hemiptera.
Doflein, Franz (05 IV 1873, Paris– 24 VIII 1924, Breslau) Isoptera.
Emden, Fritz Isidor van (03 X 1898, Amsterdam– 02 IX 1958, London) Diptera.
Escherich, Karl Leopold (18 IX 1871, Schwandorf Germany–22 XI 1951, Kreuth, Germany) Isoptera, Coleoptera.
Fletcher, Thomas Bainbridge (25 III 1878, Stonehouse– 30 IV 1950) Lepidoptera: Pterophoridae.
Fraser, Frederic Charles (15 II 1880, Woolwich– 02 III 1963, Linwood) Odonata.
Gahan, Charles Joseph (20 I 1862, Roscrea– 21 I 1939, Aylsham, Norfolk) Coleoptera.
Gordon Enoch Gates (11 I 1897–11 VI 1987), Oligochaeta.
Gravely, Frederic Henry (7 XII 1885, Wellingborough, Northampton–?) Arachnida, Insecta.
Hagen, Hermann August (30 V 1817, Königsberg, Germany–9 XI 1893, Cambridge, Mass.) "Neuroptera" *sensu lato*.
Hampson, George Francis (14 I 1860–15 X 1936, Maidstone) Lepidoptera.
Horn, Walther Hermann Richard (19 X 1871, Berlin–10 VII 1939, Berlin).
Imms, Augustus Daniel (24 VIII 1880, Moseley, Worcestershire–03 IV 1949, Tipton St. John, Devon) Collembola.
Jacoby, Martin (12 IV 1842, Alton–24 XII 1907, London) Coleoptera.
Jeannel, René Gabriel (22 III 1879, Paris–20 II 1965), Coleoptera; also collected soil arthropods.
Karsch, Anton Ferdinand Franz (19 VI 1822, Münster, Westphalia–15 III 1892, *ditto*) Arachnida.
Kaszab, Zoltan (23 IX 1915, Farmos, Hungary– 04 IV 1986, Budapest) Coleoptera: Tenebrionidae.
Kirby, William Forsell (14 I 1844, Leicester–20 XI 1912, London).
Kraatz, Gustav (13 III 1831, Berlin–02 XI 1909, Berlin) Coleoptera, Staphylinidae.
Laidlaw, Frank Fortescue (01 II 1876, Galashiels, Scotland–11 XII 1963) Odonata.
Leclercq, Jean (26 IV 1921, Beyne-Heusay–).
Lieftinck, Maurits Anne (18 II 1904, Amsterdam– 13 IV 1985, Rhenen) Odonata, Coleoptera.
Löbl, Ivan (20 V 1937, Bratislava) Coleoptera.
Marshall, Guy Anstruther Knox (20 XII 1871, Amritsar, India–08 IV 1959, London) Coleoptera.
Maulik, Samarendra (25 XII 1881, Tamluk, Bengal–9 VII 1950, Chelsea, England) Coleptera.
Michaelsen, Wilhelm (09 X 1860, Hamburg–18 II 1937, Hamburg) Oligochaeta.
Móczár, László (10 XII 1914–).
Motschulsky, Victor Ivanovitsch (11 IV 1810, St. Petersburg–05 VI 1871, Simferopol), Coleoptera; insecta coll. by J. Nietner (*q.v.*).
Philip, Cornelius Becker (12 VI 1900, Fort Lupton, Colorado–08 I 1987, San Francisco) Diptera: Tabanidae.
Pickard-Cambridge, Octavius (3 XI 1828–9 III 1917) Arachnida.
Pocock, Reginald Innes 04 III 1863, Bristol–1947) Arachnida.
Polhemus, John (11 IX 1929, Ames, Iowa–).
Poppius, Bertil Robert (28 VII 1876–27 XI 1916, Kopenhagen) Coleoptera, Hemiptera.
Raffray, Achille (1844–1923) Coleoptera: Pselaphidae coll. E. Simon (*q.v.*).
Sakagami, Shôichi Francisco (? I 1927, Tokyo–04 XI 1996, Sapporo).
Saussure, Henri Louis Frédéric de (27 XI 1829, Genf –20 II 190, *ditto*) Orthoptera.
Schedl, Karl Eduard (17 I 1898, Lienz, Tirol–18 V 1979, *ditto*) Coleoptera: Scotylidae, Platypodidae.
Senior-White, Ronald A. (1891–1954) Diptera.
Sharp, David (15 X 1840, Towcester, Northampshire–27 VIII 1922, Lawnside, Brockenhurst) Coleoptera: Dytiscidae, Hydrophilidae.
Silvestri, Filippo (22 VI 1873, Bevagna, Perugia– 01 VI 1949, *ditto*) Diplura.
Uvarov, B. P. (1888–1970).
Wasmann, Erich (29 V 1859, Meran–27 II 1931, Valkenburg, The Netherlands) Formicidae, Coleoptera.
Westwood, John Obadiah (22 XII 1805, Sheffield– 02 I 1893, Oxford) Lepidoptera and other insecta coll. by Staniforth Green (*q.v.*) *et al.*
Wiebes, Jacobus Theodorus (13 IX 1931, Rotterdam– 06 XII 1999, Leiderdorp).
With, Carl Johannes (1877, Lemvig–1923).
Wittmer, Walter (1915– 29 VI 1998, Prague) Coleoptera: "Malacodermata".

L. Chopard (1885–1971).

E. Wasmann (1859–1931).

S. Maulik (1881–1950).

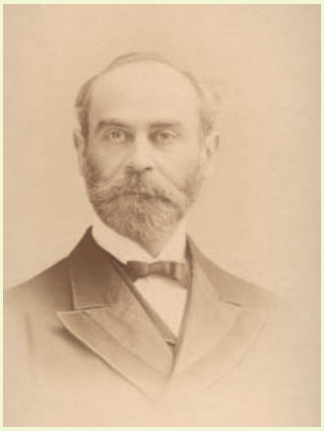
W. H. R. Horn (1871–1939), in the arms of a nurse.

H. E. Andrewes (1863–1950).

K. L. Escherich (1871–1951).

All images courtesy of Deutsches Entomologisches Institut

F. I. van Emden (1898–1958).



M. Jacoby (1842–1907).

G. A. K. Marshall (1871–1959).

In addition to describing two snakes omitted by Knox (the rat snake, *Ptyas mucosa*, and the vine snake, *Ahaetulla nasuta*) Strachan also provided an interesting description of the manner in which elephants were taken on board sailing vessels moored offshore, for export:

> "When the elephants are put on board the ships, there is a thing prepar'd of 15 or 20 double sailcloath, which is laid about his breast, belly and sides, and is tyed together upon his back, whereunto ropes are fastened; then he is led into the water betwixt elephants bred for the purpose, upon which a man sits to govern him, and another elephant (upon which sits a man) goes behind the elephant that is to be shipp'd, and when this elephant is unwilling to enter the water, the elephant that is behind puts his head into the foremost's hindeparts, and presses him forward, which will cause any person to laugh to behold the same; when he is got deep enough in the water he is tyed to the boat, the other elephants return, and he swims after the boat to the ship, where he is haled over into the ship."

Strachan also provided the first description of tobacco cultivation in Sri Lanka, noting that by the end 17th century (just over a century after Jean Nicot had discovered the plant in the New World), not only was it being widely cultivated by native Sri Lankans but also being smoked and chewed: "the Cingualeses... do take a piece of the *kapada* and roll it together, then roll a piece of dry leaf of the *wattukkan* trees about this, and kindle it at one end and suck at the other until it be consumed. Some do chew it among betle, taking but very little at once."

A few other early, eclectic studies too, deserve mention, such as Carl Heinrich Apstein's (19 September, 1862–14/15 January, 1950) descriptions of the plankton of Beira Lake, Colombo and Lake Gregory, Nuwara Eliya, in *Zoologische Jahrbücher*: *Abteinlung für Systematik, Okologie und Geographie der Tiere* (1907, 25: 201–244, and 1910, 29: 661–680, respectively). Another German, G. Bär (1924), documented the Sri Lankan Cladocera in *Jena Zeitschrift Naturwissenshaften* (60: 80–126); while a Hungarian, Jenö Eugen Daday (1898), wrote a pioneering monograph on the microscopic freshwater fauna (mainly Cladocera) of Sri Lanka in *Természetrajzi Füzetek* (Budapest) (21: 1–123), following on the work of George Stewardson Brady (1832–1921), professor of natural history at the Hancock Museum in Newcastle-upon-Tyne, who documented the 'Entomostraca collected in Ceylon' (1886, *Journal of the Linnean Society, Zoology*, 19: 293–315). In some cases, small, casual local collections proved to be of great interest, such as the three new species of earthworms collected in Horton Plains by S. W. Kemp and described by John Stephenson (1871–1933) in 'On some Indian Oligochaeta mainly from Southern India and Ceylon' (1915).

Several other cryptic and possibly important personalities remain to be researched; for example, C. R. Buller, of whom Emerson Tennent noted, "In a very large collection, made by Mr. Charles Reginald Buller during many years' residence in Kandy, and recently submitted by him to Dr. Günther, only one single specimen proved to be new or previously unknown to belong to the island." Other collectors include Alexander Whyte (*ca* 1835–1908), a naturalist who apparently ran A. Whyte and Co., a natural history supplies company in Kandy from the 1860s to the 1880s and supplied numerous specimens to various collections (R. Prys-Jones, pers. comm.). Whyte appears to have been a supplier of birds to W. V. Legge, and in fact claimed credit for some of Legge's records (see Whyte, 1877).

Biographial information on yet other recent personalities is also scarce, e.g., G. M. R. Henry's (*q.v.*) assistant, T. R. Sandrasagara, and his collector, K. L. Andrew Perera (P. Wijesinghe, *in litt.*).

BIOGRAPHICAL ACCOUNTS

Baker, E. C. S.

Edward Charles Stuart Baker (1864–1944), born and educated in Stratford-upon-Avon, joined the Indian police in 1883, serving mostly in Assam, of which state he rose to be Inspector General. He was a sport hunter of some renown, especially after "he had an arm chewed off by a leopard in Assam, was trampled underfoot by a rhino and twice tossed by a buffalo (and yet remained an excellent shot, even at snipe)" (Mearns & Mearns, 1998). According to Anon. (1944), the leopard, which had previously killed several natives, charged Baker and knocked the gun out of his hand. The only way Baker could save himself was by "pushing his left arm down the leopard's throat, when his native shikaries hit it over the head with their knives and killed it."

Baker returned to London in 1912 and was commissioned to reorganize the Port of London Police, of which he was in charge until his retirement in 1925, when he was elected a member of parliament. He later served briefly (1938–39) as Mayor of Croydon, a southern suburb of London.

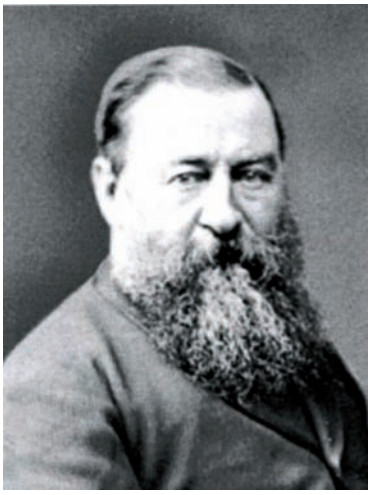
While in India Baker made extensive collections of birds, having joined the Ornithological Union in 1892. By the time of his return to England, he was acknowledged to be the foremost authority on the birds of India, and was the natural choice to revise E. W. Oates & W. T. Blanford's (1889–98) four bird volumes in the *Fauna of British India* series. This Baker did, with the work, now expanded into an eight-volume set, being issued between 1922 and 1930. Here, for the first time, almost all the birds of Sri Lanka were compared against Indian conspecifics, a task aided significantly (for the Sri Lankan birds) by W. E. Wait (*q.v.*) and W. W. A. Phillips (*q.v.*). Baker (1932–35) later wrote up the available information on nidification for the birds of South Asia. His remained until recently the only specimen-based taxonomic review of the birds of Sri Lanka.

E. C. S. Baker (1864–1944)

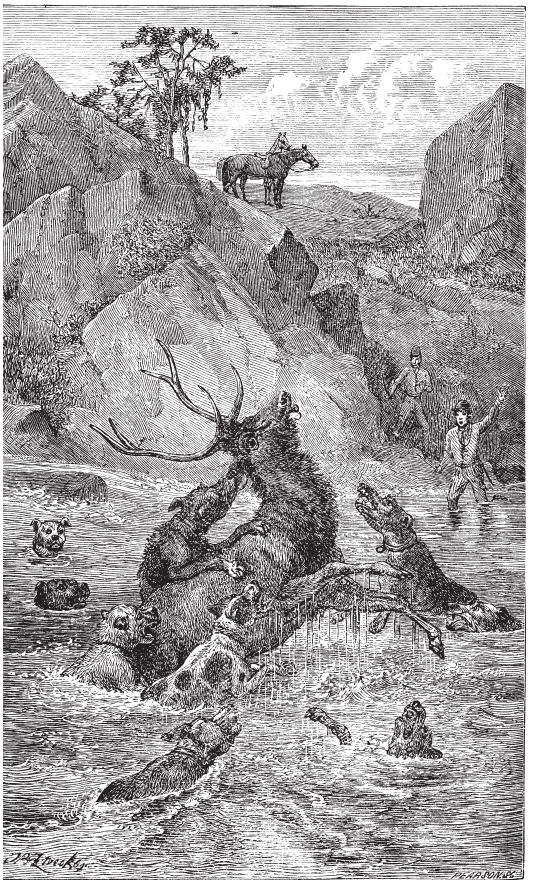
Baker, S. W.

Sir Samuel White Baker was born in London on 8 June, 1821 and educated in England and in Germany. Having in 1843 married Henrietta Biddulph Martin, he refused to take after his father (a prosperous West India merchant) and left for Mauritius from where, after two years, in 1846 he travelled to Sri Lanka, aged 24. The following year he founded a farm in Nuwara Eliya, where, aided by his brother, he encouraged emigrants from England to found an agricultural settlement. He was an avid hunter and sportsman, and during his residence in Sri Lanka published *The Rifle and the Hound in Ceylon* (1854) and *Eight Years' Wanderings in Ceylon* (1855).

His wife having died in 1855, Baker left Sri Lanka for Constantinople the following year, to supervise the construction of the



Samuel Baker's accounts of his sporting adventures in Sri Lanka, where he lived from 1846–1854, were told vividly in his *The Rifle and the Hound in Ceylon* (1853). The British in Sri Lanka were inveterate sport hunters, and Baker told it like the best of them: "The elk, in an instant, saw his advantage, and quickly thrusting his sharp brown antlers into the dog's chest, he reared to his full height and attempted to pin the apparently fated smut against a rock. That had been the last of Smut's days of prowess had I not fortunately had a spear. I could just reach the elk's shoulder in time to save the dog. After a short but violent struggle, the buck yielded up his spirit. He was a noble fellow, and pluck to the last."



Ruschuk–Varna railway, connecting the Danube with the Black Sea. In 1861 he embarked on a tour of exploration of central Africa "to discover the sources of the Nile, with the hope of meeting the East African expedition under Captains Speke and Grant somewhere about the Victoria Lake." Having spent a year learning Arabic in the Sudan, he followed the course of the White Nile 1,250 km south into the central African plateau. At Gondokoro in southern Sudan, he met up with John Hanning Speke (1827–1864, in 1858 the first European to reach Lakes Tanganyika and Victoria) and James Grant (1827–1892) who, after discovering a source of the Nile, were following the river down to Egypt. Informed by these explorers of the likely existence of another great lake from which a tributary of the Nile originated, Baker left to discover, on 14 March 1864, Lake Albert in present-day Uganda, which he named for Queen Victoria's consort. In 1866 he returned to England to be knighted by Queen Victoria.

In 1869 Baker accompanied the prince of Wales (later Edward VII) on a tour of Egypt, and later that year led a military expedition up the Nile into equatorial Africa to curb the slave trade there. Baker was given the rank of Major General and the Ottoman title of Pasha, and went on to serve as governor general of this territory—to which he referred as Ismailia, after the khedive—for the next four years. He returned to England in 1874 and the following year purchased Sandford Orleigh, a vast estate in south Devon, where he resided until his death on 30 December

1893. During his retirement he travelled extensively to the United States, Japan, India and Africa, and published several books, including *Ismailia* (1874) and *Wild Beasts and their Ways* (1890). He is remembered in Sri Lanka especially for his colourful hunting exploits, and from Baker's Falls in Horton Plains National Park, which was named for him in his own lifetime.

Bennett, J. W.
John Whitchurch Bennett (28 July, 1790–10 June, 1853), an officer in the Royal Marines (1806–13) and the British Army (1815– *ca* 1827), arrived in Sri Lanka in 1816. The following year he was appointed to the Chief Secretary's Office (of the colonial government), taking up the post of Sitting Magistrate at Galle in 1825 and at Hambantota in 1826 (Pethiyagoda *et al*., 1994). While so engaged in these coastal towns, Bennett commissioned a local artist to draw the more common and colourful coral and rock-reef fishes found in Sri Lanka's south-western coastal seas. He intended, under the aegis of the Literary and Agricultural Society of Ceylon, to publish a book of 60 plates of reef fishes. As it happened, Bennett was forced to leave Sri Lanka by 1827, and took with him 30 drawings which, published in six parts between 1828 and 1830, would become his best-known work: *A selection from the most remarkable and interesting fishes found on the coast of Ceylon…* (Bennett, 1828). It ran into three further editions in his own lifetime, and was in effect an important contribution to knowledge of Indian Ocean fishes at the time. Of the 31 specific and infraspecific names published in the first edition, Bennett was author of all but five. Apart from the drawings themselves, he also preserved—probably dried—the type specimens of the fishes themselves, but these (and the original drawings) are now lost.

Bennett was deeply attached to Sri Lanka and its people, and went on to publish a useful description of the island (Bennett, 1843) in addition to an unimportant work on 'rare and curious fruits indigenous to Ceylon' (1842) which, possibly unknown to the author, were all exotic to the island. Bennett's *Coconut palm and its use* (1831, 1836) was perhaps the earliest treatment of coconut cultivation, being thought important enough to have been plagiarized by the Australian naturalist, George Bennett (1834) (Pethiyagoda, 1996).

J. W. Bennett was, however, a keen observer and an ardent promoter of natural-history studies in Sri Lanka. In (1843) he recorded one of the earliest instances of documenting turtle movements by tagging, practised by "a Dutch gentleman, who had charge of the district". Bennett procured one of tags (in fact a bass ring) in 1826, "from a [hawksbill] turtle of 400 lbs weight".

Bennett (1843) was also able to record an early application of 'sustainable utilization' of turtles for their shells. Harvested turtles were "suspended over [a] blazing fire, until the dorsal plates (or scales as they are called) become heated and start from their horizontal position when they are rapidly stripped off… as soon as stripping is over, the despoiled animal is liberated and allowed a free egress to the sea." He did not record, however, whether any of these half-baked turtles ever returned.

Bevere, P. C. de: see Loten, J. G., below.

Blanford, W. T.
Educated initially in Brighton (Sussex, England), William Thomas Blanford (1832–1905) continued his studies in Paris and apprenticed in mercantile business in Italy. On his return to England in 1851, he joined his younger brother Henry Francis (1834–1893) at the Royal School of Mines, going on to the mining school at Freiburg, Germany, for further studies. In 1854 both Henry and William

Pterois miles and *Acanthurus lineatus*, two of the 30 colourful species of reef fishes depicted in John Whitchurch Bennett's hand-coloured *Fishes of Ceylon* (1828–30), drawn by an unknown Sri Lankan artist.

Blanford succeeded in obtaining appointments to the Geological Survey of India, the latter remaining in service until 1882 (the former was author of *An elementary geography of India, Burma, and Ceylon*, the first work on the subject, published in 1894). Working mainly in India's fast-growing coal industry, Blanford began research on the subcontinent's geology, going on to publish *Manual of the Geology of India* with Henry Benedict Medlicott (3 August, 1829–6 April, 1905), in 1879. He also extended his studies to the natural history of almost all vertebrate groups and also the molluscs, travelling widely in West Asia and North Africa, and was among the first to have suspected an ancient biotic linkage between India and Africa (Blanford, 1876). In 1871 Blanford was appointed a member of the Persian Boundary Commission, a challenge he accepted enthusiastically, sensing further opportunities to indulge in the study of natural history. Blanford's scientific contributions were widely recognized: in 1883 the Geological Society of London (of which he was elected president in 1888) awarded him the Wollaston medal, and in 1901 the Royal Society, to which he had been elected in 1874, awarded him its royal medal.

Blanford was an influential advocate for the establishment of the Indian Museum in 1878, building on the Museum of the Asiatic Society of Bengal inaugurated in 1814. He was among the founders of the *Fauna of British India* series (which included also Sri Lanka in its scope), of which he (1891) wrote the volumes on mammals and volumes 3 and 4 (1895, 1898) of the birds. This work was, in effect, the first technical treatment of the mammal fauna of Sri Lanka.

COURTESY OF THE LINNEAN SOCIETY OF LONDON

Pieter Bleeker (1819–1878), in 1860 the first ichthyologist to collect and describe Sri Lankan freshwater fishes.

Bleeker, P.

Pieter Bleeker (1819–1878) was arguably the most productive ichthyologist ever to have worked in Asia. Born in Zaandam, Holland, Bleeker trained initially as an apothecary in Amsterdam. His love of anatomy and physiology however, spurred him on to a career as a physician, training in medicine at the clinical school in Haarlem, and qualifying as a surgeon and country practitioner in 1840, aged just 21 (Bleeker, 1973). Finding it impossible to secure employment as a doctor at such a young age, Bleeker found employment in Paris, filling in his time by studying botany at the Jardin des Plantes. Unable to secure a job in the Leyden Museum, he enrolled as an officer in the Dutch East Indian army and in 1842 was posted to Batavia: he was to remain in the Dutch East Indies (now Indonesia) for the next 18 years (Harting, 1973).

Based for the most part in Java, Bleeker set about collecting and studying the marine and freshwater fishes of the region, seconding civil servants and army officers throughout the archipelago to send him preserved specimens.

Bleeker's illustrations of two new species of cyprinids he described from the Gin River, near Galle: *Puntius chrysopoma* and *Puntius pleurotaenia.*

His *magnum opus* was the richly-illustrated nine-volume *Atlas ichthyologique des Indes orientales* (1862–78) which, however, was never completed.

Bleeker's works, comprising some 500 papers, are the foundation of ichthyology in Indonesian archipelago and the eastern Indian Ocean. On his return to Europe in 1860, he stopped in Galle and made a small collection of freshwater fishes, probably wholly from the Gin River, which were described in a later paper (Bleeker, 1863a,b; 1864).

Blyth, E.

Edward Blyth (23 December, 1810–27 December, 1873), an Englishman, had no formal education in biology but through self study became a competent and noted taxonomist working on all vertebrate groups, especially birds and mammals. The early identification of a talent for chemistry led to his being trained as a druggist, though he had from a young age a passion for natural history (in which there was, however, no living to be made).

He began his working life by establishing a drugstore in Tooting in 1831, but this under-capitalized venture was doomed from the start. Managed largely *in absentia* by Blyth, whose attentions were focused on natural-history studies, it finally collapsed in 1837. In the mean time, so as to pursue his researches in natural history further, Blyth began studying Latin, Greek, French and German. Leaving his home in Tooting, he took rooms in Pall Mall in central London so as to be closer to the library of the British Museum and the zoological gardens at Regent's Park, where he tirelessly studied and measured animals both living and dead. From the early 1830s Blyth published widely in the journals of his day, as a result of which he rapidly acquired a reputation as a competent naturalist. With the collapse of his business in 1837, however, he was forced to seek employment, and became curator of the Ornithological Society of London the following year (Brandon-Jones, 2006).

In March 1841, Blyth was asked whether he might be interested in becoming the full-time curator of the collections of the Asiatic Society of Bengal, founded in Calcutta (now Kolkata) in 1784, a position he accepted with alacrity. So straightened were his means by then, however, that he was compelled to seek an advance for his passage and outfit. The terms of reference of his employment were conveyed to him by the Society as follows: "We think the office should be filled by a person who can give to the museum his principal attention, and be in attendance from 11 to 4pm. The salary is 250 Rs. a month. As to duties, we require monthly reports on the state of the museum. We do not allow specimens to be removed from the museum... as to everything connected with natural history in our mu-

Edward Blyth (1810–1873).

seum, we look to our Curator" (Brandon-Jones, 2006).

Settled in his new job, Blyth set about with zeal the task of acquiring specimens for the museum. He corresponded widely with amateur naturalists throughout 'British India', the region now usually referred to as South Asia. Cabinets of specimens began to pour in, and with them hundreds of new species. With a wealth of comparative material readily at hand, Blyth was uniquely positioned to describe these novelties, for which the Asiatic Society's journal too, was conveniently at his disposal. Despite the wealth of 'museum work' available to him, Blyth pursued also his passion for field biology, tirelessly making observations of animals in their natural habitats, and personally adding to the collections whenever an opportunity presented itself.

Despite his obvious success and prolific output, Blyth's years at the Asiatic Society were made difficult by persistent shortages of money and resources. On the one hand, his creativity significantly enhanced the Society's public image; on the other, few members of the Society (which was funded through subscription), were willing to contribute financially to fulfil Blyth's ever-growing ambitions with regard to the museum. Despite the contribution his personal prestige made to that of the Society, Blyth was also handicapped by his working-class background and lack of a university—and especially a medical—education: not only was he a paid servant of the Society but also treated as a social inferior.

Blyth's predicament was made worse by the tension between himself and senior members of the Asiatic Society in the period 1841–48, which he bore only with much impatience, amidst acrimonious allegations on both sides. Repeated requests for a raise in salary and to provide him with a retirement pension were denied by his employers. Even as his productivity increased, his financial fortunes fell to a dismal low. Finally, in December 1862, Blyth embarked for England, on a year's sick leave. He was never to return and found solace only in the annual pension of £150 grudgingly granted him.

His two decades in India, though, were by any yardstick remarkably productive. He was an encyclopaedic source of information and advice on natural history, and despite his academic shortcomings, became a correspondent of many of the leading lights of mid-19th century natural history, including Charles Darwin. Though he rarely ventured out of Kolkata, Blyth was able, by recruiting the services of amateur naturalists across British India, vastly to increase the holdings of the Society's museum. Both Frederic Kelaart and Edgar Layard (*q.v.*) sent him significant collections from Sri Lanka, from which he described and named dozens of new species; many of his type specimens still survive in the Zoological Survey of India, Kolkata (Das *et al.*, 1998). In

M. E. Bloch (1723–1799); copper engraving by Johann Goerg Krünitz (1728–1796).

addition to serving as a major source of inspiration for naturalists working in the Asian colonies, Blyth was also an ardent Darwinist and an important early advocate of evolution.

Bloch, M. E.

Marcus Elieser Bloch (1723–1799), a German physician, was among the most important ichthyologists of the 18th century. Born at Anspach, Bloch practised medicine in Berlin. His twelve-volume (1782–95) *Allgemeine Naturgeschichte der Fische* many species of Sri Lankan fish, the provenance of which, however, was given usually as "India orientalis" (i.e., the East Indies). His specimens, procured largely from "cabinets" sent from Asia, are preserved in the Naturhistorisches Museum of the Humboldt University, Berlin.

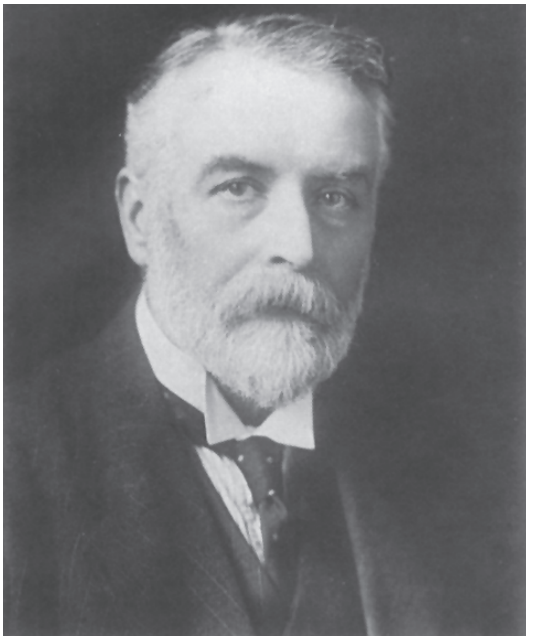
Boulenger, G. A.

Born in Brussels, Belgium, George Albert Boulenger (19 October, 1858–23 November, 1937) was educated at the Free University and went on to work as assistant naturalist at the Musée Royal d'Histoire Naturelle de Belgique, Brussels. He was a passionate taxonomist, interested primarily in herpetology and ichthyology. On his frequent visits to The Natural History Museum (then the British Museum (Natural History)) in London, he came into contact with Albert Günther (*q.v.*). In 1881, Günther hired the young Belgian as an assistant curator, assigning him to publish an updated catalogue of the Museum's amphibian and reptile holdings. This Boulenger did with astonishing speed: the nine volumes of his *Catalogue* appeared between 1882 and 1896, reviewing the world's herpetofauna as it was then known, a total of 8,469 species (Adler, 1989). He was renowned for his encyclopaedic memory and fluency in six languages. In 1894 Boulenger was elected a Fellow of the Royal Society. After his retirement in 1920, he indulged his childhood passion for roses, the two volumes of his *Les Roses d'Europe* appearing in 1924 and 1933.

Bourne, G. C.

Born in Worcestershire, England, to affluent parents, Gilbert Charles Bourne (1861–1933) was forbidden as a child from engaging in any form of vigorous exercise as a result of an (evidently misdiagnosed) heart condition. Precluded from participating in sports with other children, he took to the study of natural history, at which he excelled at Oxford.

The results of his first expedition (to Diego Garcia), a pioneering work on the formation of atolls, were published by the Royal Society in 1888 (Anon., 1933). Bourne worked mainly on marine invertebrates and published several detailed papers on the anatomy and biology of a great diversity of groups, e.g., the post-embryonic development of mush-



G. A. Boulenger (1858–1937).

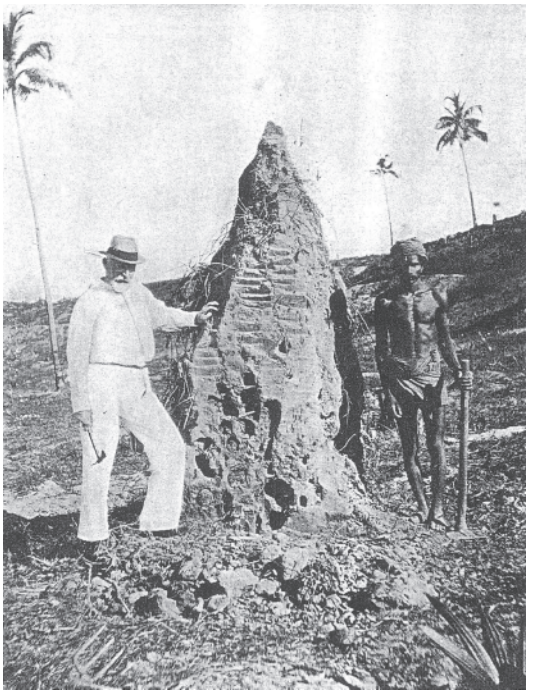
G. C. Bourne (1861–1933).

room corals, and the skeletal structure of anthozoans, about which very little was known at the time. In 1902 W. A. Herdman (*q.v.*) sent him a collection from the Gulf of Mannar, from which Bourne described a new genus of bivalve (Eulamellibranchia: *Jousseaumia* [later amended to *Jousseaumiella*] commensal with two genera of corals.

In later life, Bourne returned to Oxford, where he served as Linacre Professor of Zoology and Comparative Anatomy from 1906–21. From his teens onwards, he chose to prove his childhood physicians wrong, and went on to be Captain of Boats at Eton (later authoring an influential textbook on his favourite sport, *Text book of oarsmanship*) and living to a ripe age of almost 80.

Bugnion, E.

Edouard Bugnion, born in Lausanne on 14 August, 1845, studied medicine in Zurich, where he obtained his PhD in 1873. At Zurich he met Augustus Forel (*q.v.*), the future neurologist and myrmecologist. Bugnion specialized in embryology and pathological anatomy at the veterinary school in Zurich, later moving to the one in Bern. In 1878, he returned to Lausanne, where he began a medical practice, teaching (part-time, from 1881–1915), physiology, pathology, anatomy and embryology at the University of Lausanne. During this time, his research on comparative anatomy and biology of insects led him to travel widely: Latin America in 1895, Egypt in 1906 and finally, Sri Lanka, from 1907 to 1911. He was a pioneer in ecology and ethology of social insects, especially termites (and their interaction with ants and beetles), his knowledge of which he contributed to volume 5 of Forel's (1922) *Le Monde social des fourmis* ['The social world of the ants'] and to works of his own (Bugnion, 1909, 1910). Bugnion was a member of the Société entomologique de France and Société Vaudoise des Sciences Naturelles, La Murithienne. After the death of his first wife, he remarried and moved to Aix-in-Provence, where he died on 4 July, 1939.



Courtesy of Deutsches Entomologisches Institut

Right: the Belgian entomologist, Edouard Bugnion (1845–1939). *Left*: a photograph of Bugnion, pictured beside a termite mound in Sri Lanka on his visit of 1907–11, first published in Forel (1921–23). Sleigh (2001) opined that "this image is typical of contemporary presentations of social insects. In this later era, a foreign quality of social insects is evoked, and the portrayal of the 'savage' human is integral to that effect. The unnamed native stands slightly back; his dark body melts into the termitary's shades, while Bugnion is a startling study in white. His big stick crudely mimics the entomologist's dainty hammer. Thus the photographer has used a foreign human in order to underscore the exotic nature of the insects, whose nests—a 'mound of turned-up earth?'—now dwarfs the scales of human beings. By the 1920s, then, ants and termites were no longer familiar, prudent workers but thoroughly foreign entities."

Collett, O.

Oliver Collett (born 1867), a tea planter, was a devoted amateur malacologist who sent large series of Sri Lankan snails to experts in England, including Walter Edward Collinge (1867–1947) and William Blanford (*q.v.*). He published at least six papers in the period 1897–1901, three of them in *Journal of the Ceylon Branch of the Royal Asiatic Society.* Almost nothing else is known of him except that he became a member of the Malacological Society of London in 1896 and that he died suddenly of dysentery on 13 June, 1902, aged 35 (Collinge, 1902), and was buried at the General Cemetery at Kanatta, in Colombo.

Cuming, H.

Hugh Cuming did not ever collect in Sri Lanka; neither did he describe a single species from the island (or anywhere else). Nevertheless, so important was he a character in the history of Victorian natural history, that he must be mentioned here.

Cuming was born on 14 February, 1791 in Washbrook, South Devon, to an obscure family of modest means. Almost nothing is known of his childhood. Having apprenticed as a sail maker, in 1819 Cuming decided to seek his fortune in South America and set up a sail-making business in Valparaíso, Chile, in the days before the Panama Canal, an important

Courtesy of Linnean Society of London

Hugh Cuming (1791–1865).

Pacific port for shipping transiting the Straits of Magellan. While there, he rapidly grew prosperous, at the same time developing a keen interest in molluscs and beginning a shell collection.

By the age of 35, in 1826, Cuming had made his fortune and was able to retire to the life of a wealthy explorer-cum-collector. He built himself a schooner named *Discoverer*, fitted it out specially for making and storing collections, and set off for Tahiti and a life of adventure (Dance, 1980). An astute businessman, he rapidly accumulated a formidable collection, which he built up further through exchanges and clever trading. There was much demand for shells at the time, both from collectors and scientists, and Cuming exploited increasing demand from both quarters. In 1856 he was able to write, "I have the largest collection of land shells in the world and you may suppose [am] particularly desirous of increasing it". To the latter end he worked assiduously and when struck down by a stroke he thought would be fatal in 1849, offered his collection of 52,789 shells to the British Museum for £6,000, then an enormous sum. The Museum declined his offer, and Cuming went on to live another 19 years. By the time of his death, on 10 August, 1865, the collection, which had grown to 83,000 specimens, was finally purchased by the Museum, and for the same sum.

Although he sorted and labelled his collection meticulously, Cuming made no claim to science (indeed, he was unkindly claimed to be illiterate). By not competing with scientists, he was able to rally their support; and by making rare specimens available to them, able to win their gratitude. Dozens of species were named for him, not just in Mollusca (of which some 20 Sri Lankan species carry his name—Naggs, 1995), but from many other groups, including insects and fishes, all of which were grist to his mill. Many Sri Lankan species in London's Natural History Museum, too, owe their provenance only to him, the label reading simply, e.g., "Purchased from Mr Cuming, ex Ceylon". As far as is known, Cuming never visited the island, though in 1848, the *Journal of the Royal Asiatic Society (Ceylon Branch)* carried a paper by him, 'Hints to amateur conchologists, being suggestions for the collection and preparation of specimens', probably inserted at the instance of Edgar Layard (see also Layard, 1895). This appears to be Cuming's only publication (Naggs, 1995). It was in part Cuming, however, who dissuaded Layard from publishing more of his own discoveries, urging him instead to concentrate on collecting, while he had the opportunity of doing so, in Sri Lanka.

Cuvier, G.

Christened Jean Léopold Nicolas Frédéric, Cuvier (1769–1832), born in Montbéliard (then in Württemberg, Germany), later took the first name Georges after his deceased older

Georges Cuvier (1769–1832).

brother. In 1795 Cuvier took up a post at the Muséum National d'Histoire Naturelle, being designated Professor though only 25 years old (Pietsch, 1995). While Cuvier's fame as a zoologist rests largely on his contributions to comparative anatomy and palaeontology, his name occurs in the Sri Lankan zoological literature most frequently in connection with the fish names coined in his 22-volume masterpiece, *Histoire naturelle des poissons* (1828–1849), which was completed by his student, Achille Valenciennes (1794–1865). In this 11,253-page work, Cuvier and Valenciennes described between them a total of 4,055 nominal species, fully 2,311 of them new to science. While neither of them made collecting expeditions to Asia, they benefited from sizeable collections made in Sri Lanka by several French explorers including Leschenault, Reynaud and Sonnerat, whose names are eponymized in dozens of Sri Lankan and Indian species. A collection made by Reynaud at the hot springs of Kanniya near Trincomalee in 1827–28 in particular, turned out to be especially important: from this, Cuvier and Valenciennes (*q.v.*) were to describe no less than seven new species with the specific epithet *thermalis* or *thermoicos*.

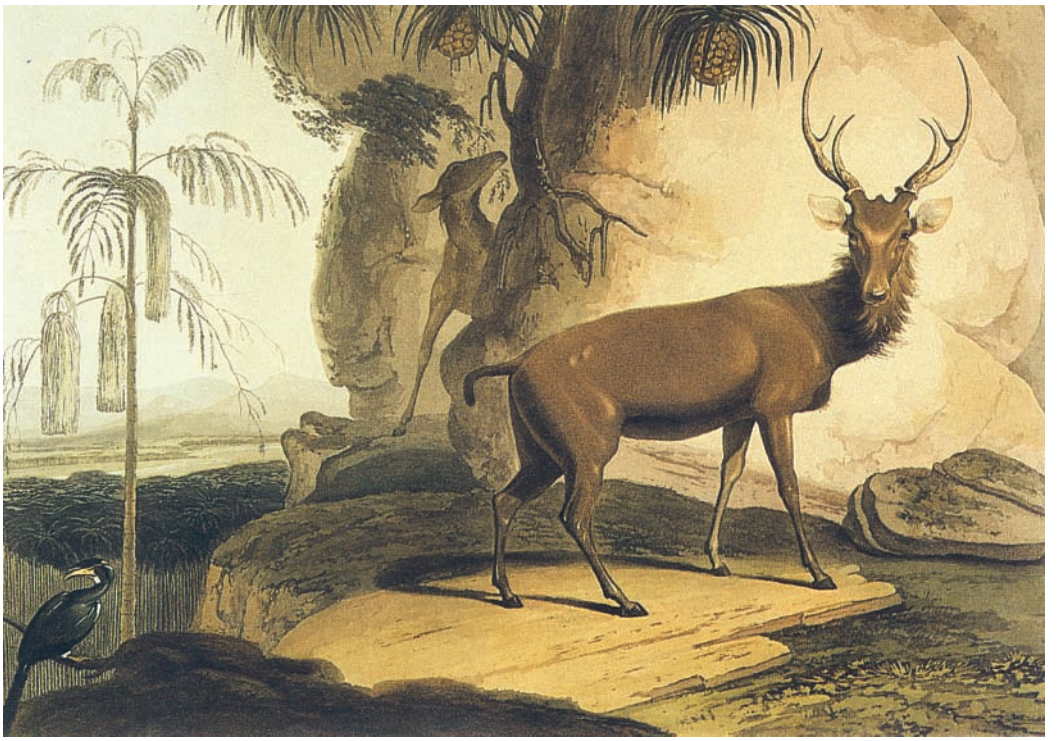
Daniell, S.

Samuel Daniell was born in Chertsey, England in 1775. The youngest of three brothers, Daniell evinced an interest in art while still at school, at the East India College at Hereford, and trained as an engraver. In December 1801 he travelled to South Africa, where he joined an expedition to Bechuanaland (now Botswana, at the time still unexplored by Europeans) as secretary and draughtsman. The delineations he made of plants and animals he encountered in the course of these explorations, many of them new to science, were published in his (1804) *African Scenery and Animals*, which contained 30 aquatint plates.

On 14 August, 1805, Daniell arrived in Galle, Sri Lanka, and secured appointment as Ranger of the Woods and Forests, a position that required him to travel widely in the island. Recognized for his artistic talents by the governor, Thomas Maitland (1759–1824), Daniell was soon invited to paint the animals maintained at the latter's menagerie at his residence in Mt Lavinia (the site of the eponymous present-day hotel). On 15 January 1808 Daniell published his *A picturesque illustration of the scenery, animals and native inhabitants of the island of Ceylon*, a compilation of 12 aquatints of great artistic merit.

In 1810, the botanical artist Maria Graham (*q.v.*) met Daniell ("the Collector of the District") at Negombo and, accompanied by him, toured the elephant craal at Dambadeniya, 16

Opposite –
Samuel Daniell's prints of Sri Lankan deer. *Above*: a spotted deer at water beneath a banyan tree in the company of a pair of jungle fowl. *Below*: a sambar stag in the foreground (doe in the background), with a hornbill at the lower left of the picture.



miles inland from there. "We left Mr Daniell at the craal," she wrote of the encounter, "where he intended to stay some time in search of subjects for his pencil. To defend himself from bad effects of his sylvan life, he smokes and lights great fires within and without his tent."

On 16 December, 1811 Daniell died in Colombo, aged just 36, and was buried in the cemetery at Pettah (de Silva, 1985; Raheem, 1986). His drawings (including a number of Sri Lankan birds), some annotated only with local names, were sent to his brother William (1769–1837), in England (Peiris, 1938). During his years in Sri Lanka, Daniell acquired a reputation as an eccentric. J. W. Bennett (*q.v.*, 1843) relates an apparently apocryphal story wherein Daniell proposed sending a delicacy in the form of "elephants' petit toes" pickled in strong toddy vinegar and cayenne pepper to the Earl of Bathurst (1762–1834), Secretary of State for War and the Colonies (an appointment that Bathurst secured, however, only in the year following Daniell's death).

Davy, J.

John Davy (1790–1868) was trained as a physician at Edinburgh, receiving his MD in 1814. He thereupon joined the British Army Medical Department, eventually rising to become Inspector General of Hospitals. Davy was stationed in Sri Lanka from August 1816 to February 1820, and was an eyewitness to the Kandyan rebellion of 1818. In 1821 he published *An account of the interior of Ceylon and of its inhabitants*, providing an early and laudably objective account of life in Sri Lanka at the fall of the Kandyan kingdom.

In addition to being a military officer and surgeon, Davy was a serious scientist, with a deep interest in anatomy and physiology, rarely passing up an opportunity to engage in scientific investigation. An entire chapter of *An account of the interior of Ceylon* was devoted to snakes of Sri Lanka and his observations on the effects of their venom on chickens and dogs. While in Sri Lanka, Davy also took time off to study the urinary organs and analyse the urine of several species of amphibians and reptiles (Davy, 1818; 1821), publishing his findings in *Philosophical Transactions of the Royal Society* (of which he was elected a Fellow in 1834). Davy also wrote extensively on the physiology of thermoregulation in humans and animals (e.g., Davy, 1845). Even when voyaging by sea, he never ceased to gather meteorological data, recording daily sea-surface and atmospheric temperatures *en route* (see p. 14). In all, by the time of his death in 1868, he had published more than 150 papers in medical and scientific journals.

Davy also discovered the gas permeability of terrestrial eggshells, noting that each egg had as many as 8,000 microscopic pores. He is, however, probably best remembered for his discovery of the toxic effects of carbonyl chloride ($COCl_2$), a poison gas widely used in World War I, for which he coined the name phosgene.

Day, F.

Born in 2 March, 1829, Francis Day enrolled at St George's Hospital, London in 1849 and obtained his membership of the Royal College of Surgeons in 1851. The following year he travelled to India to take up a position as Assistant Surgeon in the Madras Establishment, where he served in various regiments of the Indian Army. During this time he developed a passion for ichthyology, discovering for himself the astonishing richness of the freshwater fish fauna of the Western Ghats. In 1865 Day, who had returned to England on sick leave the previous year, presented a paper (Day, 1865a) on the *Fishes of Cochin* (now in Kerala) to the Zoological Society of London, unknowingly precipitating a trivial but lifelong feud with the British Museum's Albert Günther (*q.v.*) over the definition of the genus *Catopra*. Later that year he published

his *Fishes of Malabar* (Day, 1865b), the first major regional ichthyofaunal study in India after Hamilton's landmark work, *Fishes of the Ganges* (1822).

Day returned to India in 1866, this time determined wholly to dedicate his life to fish and fisheries. After an abortive attempt to introduce brown trout into the Nilgiri Hills in 1866 ('cold' transport from England around the African Cape being a formidable challenge), he focused largely on surveying the fishes of various parts of India including the Andaman Islands. By 1869, fuelled by bitter criticism by Günther in London, he was accumulating material rapidly enough to begin planning an ambitious marine and freshwater fish fauna of the whole of India. Thomas Claverhill Jerdon (1811–1872), also a surgeon naturalist who published important handbooks to the Indian birds (1862–64) and mammals (1867), had worked on the fishes of southern India (Jerdon 1848, 1851) and was already in the process of preparing a book on the subcontinent's ichthyofauna. Jerdon gave way to Day in this endeavour, however, in view of the latter's focus being single-mindedly on fishes. In 1871 Day was appointed Inspector-General of Fisheries for the whole of India and promoted Surgeon-Major. His second wife having died in 1873, he returned to England the following year together with his enormous collection of Indian fishes where, despite continuous quarrelling with Günther, he put considerable time in research at the British Museum (Natural History) in preparing his *Fishes of India… Burma and Ceylon*, which was published in four parts between 1874–78. The *ca* 1,100 illustrations of fishes for *Fishes of India* were executed mostly by George Henry Ford (1809–1876), 'perhaps the most talented of all natural history artists then in London' (Whitehead & Talwar, 1976). After his death on 10 July, 1889, Day's collection of more than 15,000 fishes was scattered among the leading natural history repositories of the world

Courtesy of Linnean Society of London

Francis Day (1829–1889), "The father of South Asian ichthyology".

(Ferraris *et al*., 2000), including important series now in the Zoological Survey of India at Kolkata and the Australian Museum at Sydney.

In *Fishes of India* Day presented for the first time names, descriptions and illustrations of all the fishes then known also from Sri Lanka, and the scope of his work has not been surpassed in the 125 years since its publication. With only relatively minor nomenclatural changes and taxonomic revisions having been effected since, Day's book continues to be the standard work on Sri Lankan ichthyology, upon which all subsequent reviews have been based.

de Fonseka, T.

Terence de Fonseka was born on 06 September, 1919 in Kalutara, Sri Lanka and educated

Terence de Fonseka (1919–2000).

Paul Edward Peiris Deraniyagala (1900–1975).

at St. Peter's College, Colombo and Holy Cross College, Kalutara. Having won an entrance scholarship to University College, Colombo, he went on to obtain a degree in zoology from the University of London. He served for two years as a graduate probationer in the Department of Agriculture and entered the Ceylon Civil Service in 1945, serving in a number of government establishments, including the Department of Fisheries where, as director, he initiated a successful programme for mechanization of fishing craft. He later served as permanent secretary to the ministries of Commerce, Nationalized Services, and Social Services, until his (premature) retirement in 1970, when he emigrated to England, where he worked in the Department of Health until 1984. De Fonseka was from childhood fascinated by Odonata, of which he was an avid collector. He published little in the course of his life, and is remembered mainly by *The dragonflies of Sri Lanka* (2000), which was published shortly after his death, on 21 March, 2000, in Finchley, North London.

Deraniyagala, P. E. P.

Paulus Edward Deraniyagala Peiris was born on 8 May, 1900 to one of Sri Lanka's most distinguished families (burgeoning nationalism in the early 20th century caused him to interchange his last two names in later life, Peiris being a name of Portuguese origin). His father, Paulus Edward Peiris (later Sir Paul), had been the first native Sinhalese to enter the prestigious Ceylon Civil Service in 1896, and was a celebrated judge who later served as Public Trustee until his retirement in 1935. He was also a linguist and a historian of some repute, and the first Asian to be awarded (in 1917) a D.Litt. from the University of Cam-

Courtesy of Dr Siran U. Deraniyagala

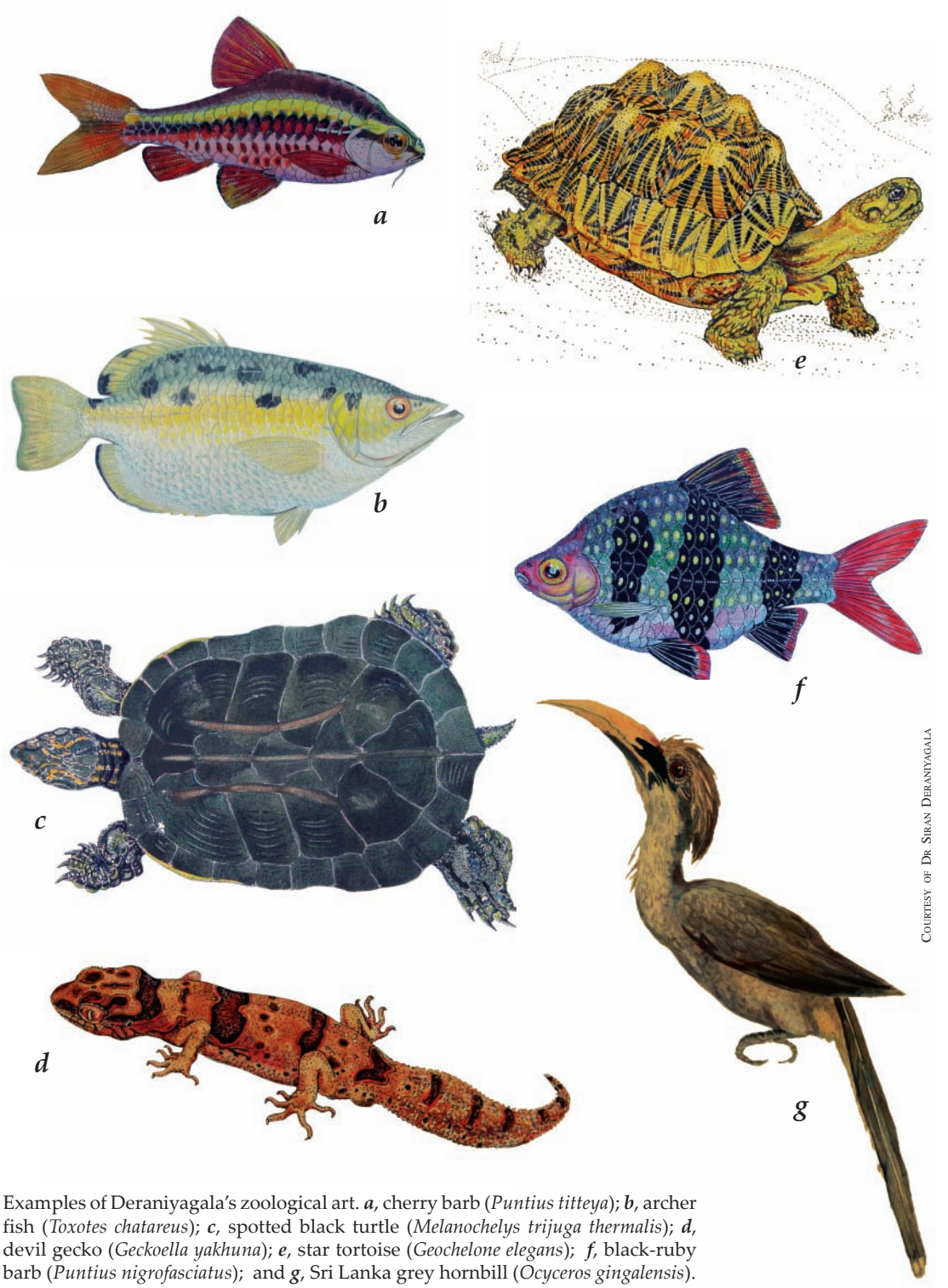
Despite being widely travelled by the standards of his time, Deraniyagala was fascinated by Africa in his tours of 1947, during which he indulged in his favourite pastimes of ichthyology, prehistory, palaeontology and art. It was the only part of his life from which there is a substantial photographic record. *At left*, a Denka girl drawn by him; and *above*, native fishermen with a large Nile perch, near Lake Rudolf.

bridge. Not surprisingly, he ensured that his son's early years were spent in an atmosphere of scholarship and learning. Paul's mother, Hilda *née* Obeyesekera, was a distinguished pianist and in later life, a prominent philanthropist.

Deraniyagala's devotion to natural history came early, and he was known to have maintained a menagerie of assorted invertebrates in the bedroom of his boyhood home. After his early education at the Government Training College, he enrolled at St. Thomas's College, a secondary school at Mutwal, later relocated to Mt. Lavinia.

He studied anatomy briefly at Colombo's Medical College between leaving school and proceeding to Cambridge University to study zoology in 1919, graduating with an MA in 1923 and then spending a semester at Woods Hole to study marine biology before going on to the Museum of Comparative Zoology at Harvard for a master's (AM) degree. On his return to Sri Lanka in 1925 he joined the then Museums and Fisheries Department, Colombo, as First Assistant Marine Biologist and by 1937 had an opportunity to serve as Acting Director of the Colombo Museum. On 27 April 1939 he was appointed Director (the first native Sri Lankan to hold that office) and continued until his retirement in July 1963. He persisted in his researches until his death on 1 December, 1973 (Dias, 1980).

Deraniyagala's publications, spanning the period 1929–63, number some 379 books and



Courtesy of Dr Siran Deraniyagala

Examples of Deraniyagala's zoological art. ***a***, cherry barb (*Puntius titteya*); ***b***, archer fish (*Toxotes chatareus*); ***c***, spotted black turtle (*Melanochelys trijuga thermalis*); ***d***, devil gecko (*Geckoella yakhuna*); ***e***, star tortoise (*Geochelone elegans*); ***f***, black-ruby barb (*Puntius nigrofasciatus*); and ***g***, Sri Lanka grey hornbill (*Ocyceros gingalensis*).

Courtesy of Dr Siran Deraniyagala

An expert pugilist himself, Deraniyagala had a passion for the martial arts and combat between animals, pursuits represented frequently in his paintings and sketches. Here, hunting boar with hounds, armed only with a knife.

papers (Anon., 1980), including some 47 on ichthyology, 75 on herpetology, 15 on ornithology, 45 on mammalogy and 120 on palaeontology and prehistory (he has been the only palaeontologist of note to have worked in Sri Lanka). As is evident from this diversity of topics, his tastes were indeed eclectic. He worked extensively on all the vertebrate groups except amphibians (on which he published but one paper, on an abnormal specimen) and birds, though he had a fondness for poultry and kept several pet bantams. He was the discoverer of a large number of new species in Sri Lanka, including three snakes, seven lizards and six freshwater fishes (several other nominal species lie in the synonymy). Following his retirement in 1963 the decline of the museum was rapid (as the content of the Museum's journal, *Spolia Zeylanica*, shows), its institutional capacity for explora-

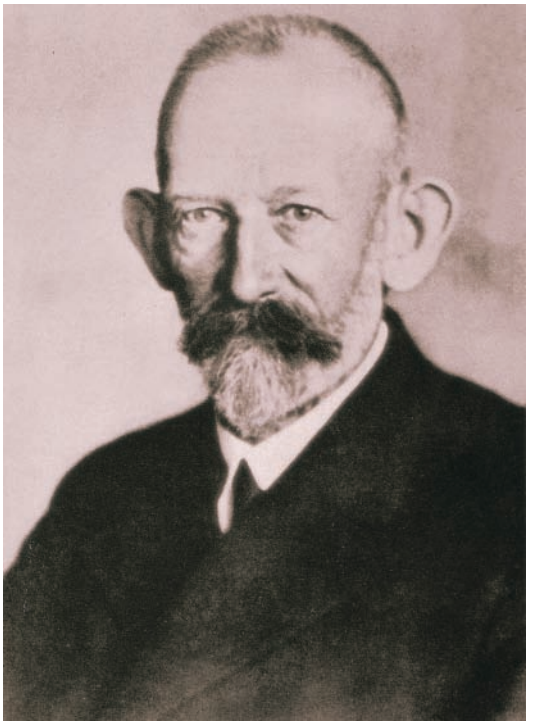
P. E. P. Deraniyagala at work on fossils in his laboratory in the Colombo Museum.

tion and research soon becoming marginal. Nevertheless his legacy was so remarkable that the study of natural history in Sri Lanka could aptly be divided into two eras: Before Deraniyagala and After Deraniyagala.

Deraniyagala was by far the most productive naturalist ever to have worked in the island, though sadly he failed to build an academic lineage around him. He was the sole author of all his publications, and was generally not given either to collaborate with or encourage others; neither did he use the extraordinary social advantage he possessed for the Museum's benefit. His prolific output did attract cynical criticism, not least with regard to his discoveries of fossil mammals (including a lion, a rhinoceros and a hippopotamus) from the Ratnapura district, and the prehistoric humans he dubbed Balangoda Man. He was subjected to endless jibes and sarcastic asides from envious lesser men who sought to imply that he was fraudulently passing these specimens of as Sri Lankan when in fact he had collected them in Africa. Although deeply offended by these insults, Deraniyagala rarely deigned to answer his critics, letting his publications and his specimens speak for themselves.

Duncker, G.

Georg Duncker (16 May, 1870–28 July, 1953), the eldest son of a wealthy Hamburg merchant, simply loved being on the water, founding a boating club in his native Hamburg when he was just 17. He studied medicine and zoology at the universities of Kiel, Freiburg and Berlin, but later forsook medicine for zoology, having from childhood been fascinated by aquatic fauna (his work as a physician during the Hamburg cholera epidemic however, won him a commemoration medal). Obtaining his PhD in February, 1895, Duncker spent time at the marine laboratory in Plymouth (1897), the winter of 1897/98 at the marine station in Naples and the summer of 1898 at Cold Spring Harbor Laboratory in Long Island.



Georg Duncker (1870–1953).

In 1900 he embarked on an expedition to Polynesia, *en route* to where he probably visited Sri Lanka for the first time. Duncker wrote later that the crew were inebriated for most of the voyage, leading to his having to helm the ship for much of the time. In all, the trip appears to have proceeded with a minimum of responsibility, in one instance provoking an attack by the natives that resulted in the death of the expedition leader. This caused Duncker to jump ship at Kuala Lumpur, where his talents led him in February 1901 to be invited to serve as curator of the Selangor State Museum. He held the job only briefly, however, and decided to return to Germany, but not before touring Sumatra, India and Sri Lanka.

Duncker returned to Europe *ca* 1902, where he turned down a professorship in zoology from the University of Munich and opted in-

stead to make a second voyage to Polynesia, touching at Colombo on the return. This time he made an important collection of fishes at Wakwella, on the Gin River near Galle (now preserved at the Biocenter Grindel und Zoological Museum, University of Hamburg), which he studied through comparison against Day's and Günther's material in the British Museum (Natural History), in London. He then withdrew to the Hamburg Museum, where he worked until his retirement in 1934. Despite the preponderance of taxonomic papers among his publications (which included whole-family revisions), Duncker's interests were not confined to systematics. He was deeply interested in the biology of fishes (conducting even some pioneering cross-species hybridisation experiments), and was a respected biostatistician (Klatt, 1953). His *Die Süsswasserfische Ceylons* [Freshwater fishes of Sri Lanka] (1912) was the first work entirely devoted to this fauna, and its usefulness even today is a tribute to Duncker's thoroughness.

Emerson Tennent, J.

Born in Northern Ireland, James Emerson (7 April, 1804–6 March, 1869) was educated in law at Trinity College, Dublin, being called to the bar from Lincoln's Inn, London in 1831. He was in his early life drawn to natural history and went on to make a collection of beetles around Belfast (Nash & Ross, 1980). A dedicated scholar from his early years, he published his *History of Modern Greece* in 1830.

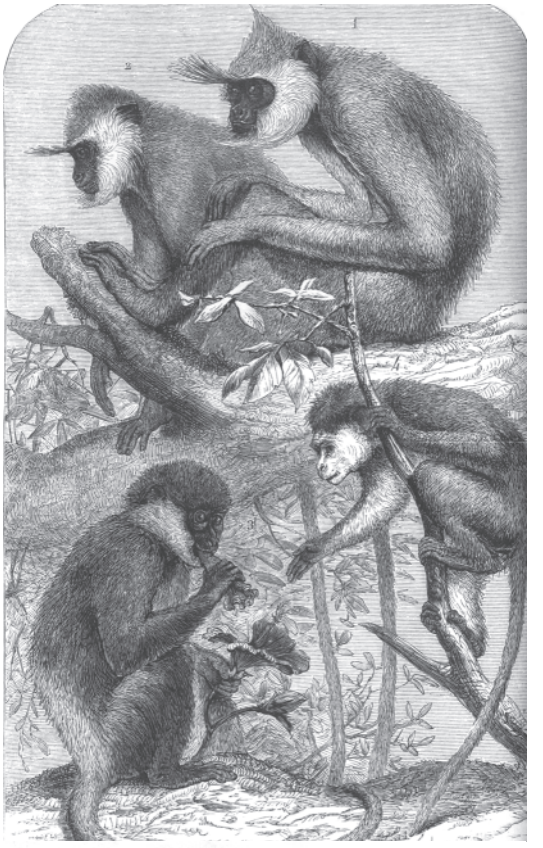
In 1831 he married Letitia Tennent of Belfast and Tempo, daughter of William Tennent, a wealthy and influential banker. In terms of William's will, Emerson was required to adopt the surname of his wife's family, and in 1832 he took the name James Emerson Tennent.

Emerson Tennent ran for parliament in Belfast as a Whig in 1832, crossing the aisle of the house to the Tories in 1834 after having come under the influence of Edward Geoffrey Stanley (1799–1869), later 14th Earl of Derby. This transfer of allegiance would prove fateful in his future career. He continued to serve as a member of parliament for Belfast from 1832 to 1845 and from 1841 served as Secretary to the Board of Control. In 1845 he was knighted and appointed Colonial Secretary of Sri Lanka. Emerson Tennent had already become well known as originator of the Copyright of Designs Act of 1842, having served also as the Joint Secretary to the India Board (1841–1845).

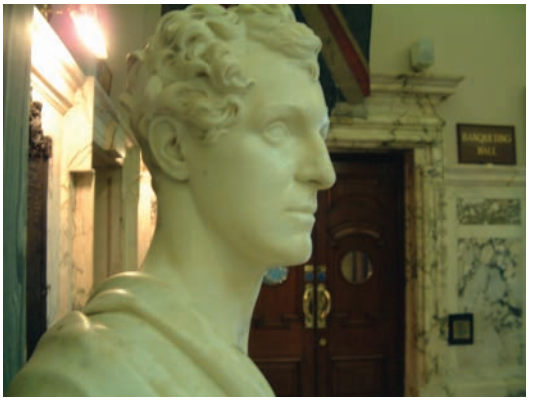
Arriving in Sri Lanka, Emerson Tennent was not long in discovering that despite the possession of great natural riches, the colony had no book on this topic. He began accumulating material and drawings for a book shortly after he arrived, aided by a number of local assistants, completing the work on his return to England in 1849. Emerson Tennent's tenure in Sri Lanka, however, did not end happily. He was Secretary to George Byng, the youthful 7th Viscount Torrington (1812–1884), arguably the most mediocre of the island's British governors. Together, they had to share responsibility for the Kandyan Rebellion of 1848, brought about in part by entire villages being dispossessed of their lands and hunting grounds as the British Raj carved up the country and sold it to coffee planters. The straw that broke the camel's back, however, was a series of rumours of new taxes proposed by the Colonial Secretary in consequence of the government having to make up a deficit of £40,000 resulting from the abolishing of export duty on coffee and a reduction of the duty on cinnamon owing to a slump in demand. On 1 July 1848, at the Colonial Secretary's behest, licence fees were imposed on guns, dogs, carts and shops.

Captain John Macdonald Henderson of the 78th Highlanders, one of the officers sent to Matale to quell the rebellion, gave a remarkably objective rationale for Sinhalese disaffection:

Sir James Emerson Tennent.



Right: Sri Lankan primates, and *below*, two species of endemic horned lizards from Sri Lanka; in the foreground is *Ceratophora tennentii*, a species named for Emerson Tennent by Albert Günther (*q.v.*) in the former's *Sketches of the Natural History of Ceylon* (1858).



Marble bust of Sir James Emerson Tennent (1804–1869) in the Belfast Town Hall.

> "New taxes were determined upon, some of them being about the most foolish and unjust, and, I may add, impracticable, that could well have been hit upon. The most obnoxious of these were the dog and gun taxes, the road or, as it has been called, the poll tax and the shop tax. The idea of making people in a Buddhist country, where it is contrary to their creed to "drown blind puppies" to take any life at all, to pay one shilling per annum for every "mongrel puppy, whelp or hound, or cur of low degree" that might haunt their dwellings was rich in the extreme. But it was also unjust as well as absurd for other reasons than the above. Many of the Kandyans in remote villages live very much by hunting, [for which] their dogs are often absolutely necessary. [Besides], people would not own the dogs; indeed in most cases they belong to no one and forage where they can."

Emerson Tennent's intensive (if purely academic) researches into all aspects of Sri Lankan life evidently fuelled further suspicion among the Sinhalese, who clearly had no difficulty in believing that a government capable of taxing stray dogs could stoop to anything. In an irreverent footnote, Henderson observed, "The wildest rumours arose from Sir Emerson's statistical inquiries for his meditated books. Among others that the women were to be taxed in proportion to the girth across their breasts" (Ludowyk, 1962).

On 26 July 1848 the leaders of the rebellion had themselves consecrated at the ancient Buddhist temple at Dambulla, and a revolt began in earnest. Two days later Torrington declared marshal law and the revolt was quelled by the British with ferocity widely considered excessive in the extreme. On Torrington's orders there was much shedding of blood and confiscation of property, on the spurious grounds that the revolt threatened British power in the island. He failed to see that he had largely himself to blame for the predicament in which his administration found itself, a consideration not lost on the more liberal-minded among Colombo's British elite. Many among them were horrified at the colonial government's excesses, and Torrington and Tennent soon came in for stern criticism in the local newspapers, whose reports were not long in percolating to London. The latter was singled out for particular ridicule, being unkindly dubbed Sir Timorsome Emmet by the British community in Sri Lanka, "on account of his exploit in running away from a crowd in Galle" during the revolt (Ludowyk, 1962). By 1850 both Torrington and Emerson Tennent had been recalled to England.

In 1851, the Ceylon Committee of the House of Commons began an inquiry into Emerson Tennent's tenure as Colonial Secretary. No longer an MP, he viewed this inquisition as a deliberate act of harassment visited on him by the Whigs in retribution for his defection 17 years before. The inquiry, however, came to nothing and in 1852 he was appointed Permanent Secretary to the Board of Trade, a position he held until his retirement in 1867, in which year he was also created a baronet. He is widely recognized as the inventor, during this time, of the competitive entrance examination for the civil service.

Emerson Tennent spent his retirement at Tempo Manor (on Tempo Estate, which had

been purchased by his father-in-law in 1814), a mansion he commissioned Sir Charles Lanyon (1813–1889) to design, and work on which was completed in 1869.

Although he is perhaps best remembered in Sri Lanka for his *Sketches of the Natural History of Ceylon* (1861) and two-volume *Ceylon* (1959), he also wrote a scholarly treatise evidently written while he was still in Sri Lanka, *Christianity in Ceylon: its introduction and progress under the Portuguese, the Dutch, the British, and American missions* (1850). He worked assiduously in his retirement also on a *History of Ireland*, which, however, was never completed. Elected a Fellow of the Royal Society in 1862, Emerson Tennent went on also to write several books of arguably lesser importance. His *Natural History* was well accepted and was for many years a standard work on the biodiversity of the island: after his return to London, he went to great pains to verify scientific names and other technical details with experts of the time, especially those at the British Museum (Natural History), whom he was careful to acknowledge in the introduction to that work, in which he also made it clear that individual chapters had been vetted by specialists. He stated, however, that the book was intended only as a "*mémoir pour servir*" and not a compendium of the natural history of Sri Lanka. Nevertheless, the book did, for the first time, provide checklists of Sri Lankan fauna, including the first inventory of insects, compiled by Francis Walker (1809–1874), based largely on the collections in the British Museum (Natural History) and specimens sent to him by Robert Templeton, Edgar Layard and others from Sri Lanka. Henderson's unkind quip on *Sketches of the Natural History of Ceylon*, "All that is true in it is not new, and what is new in it is not true", reflects the view prevalent at the time that Emerson Tennent used his high office to cause others to do his work for him, the final result of which he merely edited and published.

Courtesy of Deutsches Entomologisches Institut

Carlo Emery (1848–1925).

Emerson Tennent's papers, at the Public Record Office of Northern Ireland, show that of his extensive correspondence, little is related to natural history. He clearly saw himself more as a collator and communicator than an original researcher.

Emery, C.

The hymenopterist Carlo Emery was born in Naples, Italy, on 25 October, 1848. Emery wrote the original descriptions of 22 of Sri Lanka's presently-recognized 191 species of ants. He was based first in the University of Bologna, where he was Professor of Zoology, and later in Geneva.

Although Forel (*q.v.*) described many more Sri Lankan ants than Emery did, the latter is credited with the discovery of two remarkable taxa: the relict ant *Aneuretus simoni* (and there-

William Ferguson (1820–1887).

by, the endemic formicid subfamily Aneuretinae, which is now a relict in Sri Lanka) and the queenless ponerine ant, *Diacamma ceylonense*. Emery died at Bologna on 11 May, 1925.

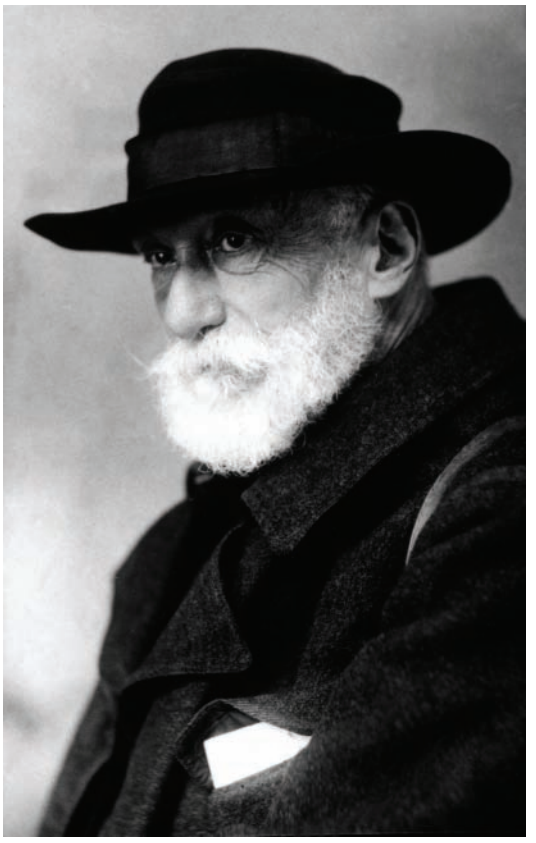
Ferguson, W.

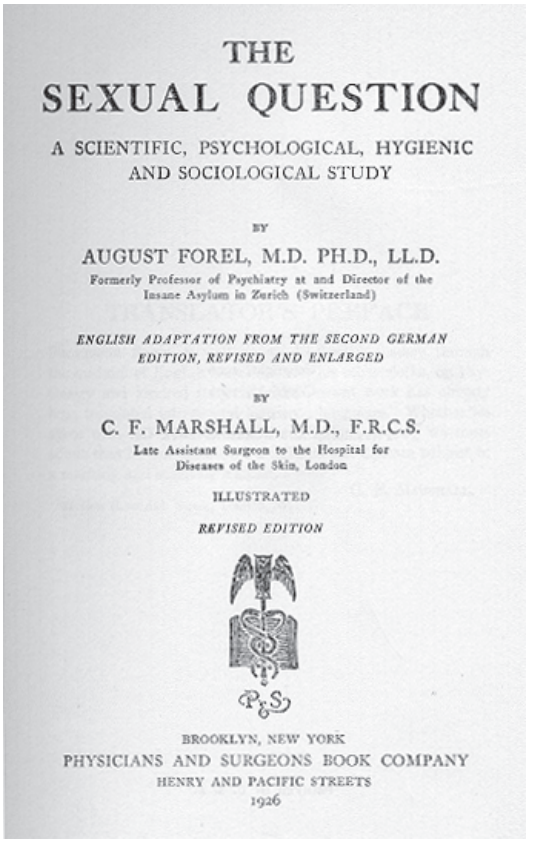
Born probably in Scotland in July, 1820, William Ferguson arrived in Sri Lanka aged 19 and was to remain there for the rest of his life. He worked initially as a surveyor, later rising to the rank of Superintendent of Works and City Engineer of the Colombo Municipality. He was an indefatigable collector of both plants and animals, able to focus with equal zeal on groups as diverse as algae, grasses, birds and reptiles. His early career as a surveyor resulted in opportunities for travel to remote parts of the island, enabling him to make fresh discoveries wherever he went.

While Ferguson was a keen amateur botanist, his publications were mostly popular works, hence rarely cited. His arguably most lasting contribution to zoology was the collection of amphibians and reptiles he sent to Albert Günther (*q.v.*) of the British Museum (Natural History) in London, subsequently summarised in Ferguson (1877). He is remembered as the author of the uropeltid snake genus *Aspidura,* the monotypic plant genus *Fergusonia* (Rubiaceae), endemic to Sri Lanka and India, also being named after him by Joseph Hooker. Ferguson's *Reptile fauna of Ceylon* was the first comprehensive annotated checklist of the island's herpetofauna, including 41 species of amphibians and 139 species of reptiles (Adler, 2001). He conducted an extensive correspondence with Günther, sending him regular consignments of specimens from Sri Lanka. Günther reciprocated by naming a species of *Ixalus* (now *Philautus*) for him. Ferguson died in Colombo on 31 July, 1887. His contribution to natural history was sufficiently important for his obituary to have appeared in *Nature* (1887, 36: 931).

Forel, A.-F.

Few workers associated with natural-history research in Sri Lanka made a greater contribution to 20th-century science, or aroused more controversy, than Auguste-Henri Forel (1 September, 1848–27 July, 1931). Born at LaGracieuse, near Morges, Switzerland, Forel studied medicine at the University of Zürich (1866–71) and went on to do research on neuroanatomy at the University of Vienna, from where he graduated in 1872. He then went on to practice as a physician in Munich, continuing his neuroanatomical research at the same time (e.g., his discovery of the tegmental fields of Forel or *campus Foreli*). From 1877, Forel began publishing his research on neuroanatomy, announcing the discovery of several previously unknown structures of the brain. In 1879 he was appointed director of




THE
SEXUAL QUESTION
A SCIENTIFIC, PSYCHOLOGICAL, HYGIENIC
AND SOCIOLOGICAL STUDY
BY
AUGUST FOREL, M.D. PH.D., LL.D.
Formerly Professor of Psychiatry at and Director of the
Insane Asylum in Zurich (Switzerland)
ENGLISH ADAPTATION FROM THE SECOND GERMAN
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BROOKLYN, NEW YORK
PHYSICIANS AND SURGEONS BOOK COMPANY
HENRY AND PACIFIC STREETS
1926

Left, Auguste-Henri Forel (1848–1931); *right*, Forel 's 1905 book, *Die Sexuelle Frage* ('The Sexual Question') was a bestseller that ran into 17 editions; it was considered suitable for translation into English, however, only two decades later, after it had already appeared in a number of other languages.

the Burghölzli Asylum in Zürich and professor of psychiatry at the University of Zürich, where he pioneered the humane treatment of the insane and studied the causes of insanity. In 1887, having made vast improvements to microtomy (the preparation of thin slices of tissue for microscopic examination), Forel published a celebrated paper on neurons (the cellular functional units of the nervous system and brain) some four years before Wilhelm von Waldeyer-Hartz (1836–1921), who coined the term and is widely credited with the discovery.

With that, Forel withdrew from neurophysiology and turned his attention to the study of hypnosis and alcohol dependence. He was an early advocate of therapeutic hypnosis, and an outspoken promoter of alcohol abstinence.

Forel was also a pioneer of sexology and became joint-chair of the World League for Sexual Reform.

In 1898, in his 50th year, he retired from the Burghölzli and began working intensively on sexuality and on alcohol dependence. His 1905 book, *Die Sexuelle Frage* ('The Sexual Question') was a bestseller: it ran into 17 editions and was translated into a number of languages. This was perhaps the first book ever to treat sex scientifically, from both the biological and sociological perspectives, free from morality imposed by religion. His argu-

ment that justice should be based on science and not merely reflect 'secularized religion' drew applause from liberal thinkers of the time, but was roundly condemned by moralists and the church. Not surprisingly, Forel's work had much influence on the young Sigmund Freud.

Forel shocked early 20th-century Europe by recognizing not just the complete legal equality of the sexes, but also by demanding the decriminalization of all mutually consensual sexual acts among adults, including incest and "all perversions" so long as they did not violate the rights of others. With regard to homosexuality, he loudly regretted that marriage between men was prohibited, arguing that it would be "quite harmless to society". He also advocated the free availability of contraceptives, going so far as to justify abortion in cases of rape or risk to the mother's life.

Some of Forel's ideas would be difficult to sell even today: for example, his view that laws against sex with animals were frivolous:

> A poor imbecile, who is scorned by all girls, is prompted by his unsatisfied sex drive to mate with a contentedly chewing cow in the darkness of the stable. The cow pays no attention and is not inconvenienced at all, either in her modesty or in her well-being… From where does the law get the right to punish such an act? This is a relic of religious mysticism: something similar to punishing the sin against the Holy Spirit.

Though he was a fervent pacifist, Forel's naive advocacy of scientific selection (e.g., that people with hereditary diseases should be induced to undergo voluntary sterilization) led to his ideas being widely abused with the rise of Nazism in post-war Europe (on the contrary, Forel deplored the 'unnatural selection' that resulted from war, whereby the healthiest people die in battle, with only the old and the feeble surviving, a situation reversed in some species of ants). He was also adamantly opposed to the death penalty, spoke publicly against anti-Semitism, saw mixed-marriage as a key solution to racism and nationalism, and advocated socialism and social education as an answer to war.

In 1912 Forel suffered paralysis of his right arm as a result of stroke, unfortunately just as he was about to depart on a long tour of tropical Asia. Despite his advanced age, he taught himself to write with his left hand, and his scientific output was undiminished. Fiercely agnostic from his teenage years, he adopted the Bahá'í faith in 1920, and was rewarded by a Tablet (epistle) from the Bahá'u'lláh himself.

It is difficult to imagine how someone so scientifically productive could have been equally productive in yet another field, but that is exactly what Forel was. As a boy of between five and eight years of age, Forel had become interested in myrmecology (the study of ants): ants were for him from childhood a passionate 'amateur' pursuit. He began publishing on their systematics at an early age, *Les Fourmis de la Suisse* ('The ants of Switzerland', 1874) appearing when he was just 26. The book won for Forel the gold medal of the Swiss Society of Natural Sciences and the Académie des Sciences de Paris, and served also to open a correspondence of many years with Charles Darwin. By the beginning of World War I, he was reputed to possess the largest collection of ants then in existence, with dozens of collectors selling or donating specimens to him from remote parts of the world, including Sri Lanka and India.

Between 1892 and 1913, Forel published 17 papers on the ants of Sri Lanka and India, totalling some 550 pages, mostly in *Journal of the Bombay Natural History Society*. Of the 191 species of ants currently recognized from Sri Lanka, Forel was the original describer of 60 (Agosti and Johnson, 2005). In addition to these 60, Forel was author of a number of species now relegated to synonymy, including a

second nominal species from the monotypic relict genus *Aneuretus,* which he named for its collector, Professor Buttel-Reepen (Forel, 1913). In all, Forel described more than 3,000 new species of ants in his lifetime (Cockerell, 1937), publishing also several important books on the subject, including his five-volume *Le monde social des fourmis du globe* in (1921–1923). He also delved into the biology and 'psychology' of ants, provoking much controversy by his 1905 monograph, *Ants and some other insects*, in which he compared the mental processes of ants to those of humans.

Though much of contemporary Switzerland was scandalized by Forel's rationalist views, much has changed in the intervening century, which has seen the establishment of a Unité de Sexologie at the University of Geneva and the placement of Forel's portrait on the Swiss 1,000-franc banknote.

Fraser, F. C.

Born at Woolwich, England, Frederick Charles Fraser (15 February, 1880–02 March, 1963), was a physician who in 1907 joined the Indian Medical Service. He was interested in natural history from his childhood, and began to specialise on Odonata early in his career as an 'amateur' entomologist. Fraser served for many years as a lecturer in obstetrics and gynaecology at Madras University Medical School, taking time off to make extensive entomological collections, especially Odonata from throughout 'British India', including Sri Lanka. In his lifetime Fraser published some 300 papers, almost all of which, being an accomplished artist, he illustrated himself. He was charged with authorship of the three Odonata volumes of *Fauna of British India* (1933–1936), and wrote extensively also on the dragonflies and damselflies of Australasia. His collections, including the type specimens of hundreds of new species he described, are at The Natural History Museum, London, together with a collection of 89 watercolour drawings of larvae of Indian (and Sri Lankan) Lepidoptera (1908–1918).

Gould, J.

John Gould, the son of a lowly gardener, was born at Lyme Regis, Dorset, on 14 September, 1804. Having obtained only a rudimentary education, Gould secured employment, first as gardener and then as curator and preserver (taxidermist) of the collection of the Zoological Society of London when aged just 23. It was his job to unwrap, label and register every specimen received by the Society, a position that not only brought him into contact with the foremost ornithologists of his day, but also enabled him to be the first to receive cabinets of birds sent to the Society from overseas.

In 1830 Gould received a large series of Himalayan birds (the provenance of which is now not known), including several new species. Lacking the scientific, literary and artistic skills to write this up himself, he delegated writing of the text to Nicholas Vigors (1785–1840) and preparation of the lithographs to his wife, Elizabeth (1804–1841). The result, *A century of birds from the Himalayas* (1830–32), published under his own name, shot Gould to fame. This was the beginning of a long and extremely successful publishing career in ornithology, in which it was Gould's scholarly clerk, Edwin Prince (1809–1874), who did most of the writing, at the same time also running Gould's publishing business.

In his visit to that continent in 1838–40, Gould caused a large collection of birds and mammals to be made, laying the foundation for pioneering works including *The birds of Australia* (1840–69) (in eight volumes with 681 hand-coloured plates) and *The mammals of Australia* (1845–63), with 182 hand-coloured plates. He followed this up with *A monograph of the Trochilidae*, in which he described as new some 20 percent of the known ~320 species of hummingbirds.

Gould's works also illustrate several Sri

John Gould (1804–1881).

The Sri Lanka Blue magpie, *Urocissa ornata*, from John Gould's *Birds of Asia* (1850–83).

Lankan birds, painted from skins, mainly in his *Birds of Asia* (1850–83, with 531 plates, completed posthumously by Richard Bowdler Sharpe, 1847–1909). Although his books—41 volumes in 'elephant folio' size, totalling some 3,000 bird drawings—are priceless today (*The birds of Australia*, for example, sells for over a million dollars nowadays), and despite his having been arguably the most successful bird collector of all time, his legacy is one of exploitation, not least of his wife, who until her death aged just 37, painstakingly and without complaint illustrated his books while serving also as the mother of their eight children. Gould died in London on 3 February, 1881.

Gray, J. E.

Born at Walsall, Staffordshire, John Edward Gray (12 February, 1800–1807 March, 1875) apprenticed as a druggist and then trained as a physician at St Bartholomew's Hospital in London, and later at the Middlesex Hospital. He quit the practice of medicine in 1823, however, and was hired by the British Museum, charged initially with cataloguing the reptiles. Gray went on to serve the museum until 1874, becoming Keeper in 1840 (he was elected a Fellow of the Royal Society in 1832). He zealously built up the museum's zoological collections, adding to it an estimated one million specimens in the course of his career. Gray was a prolific writer, and went on to publish more than 1,000 papers (almost all of them taxonomic) in various British journals (Gunther, 1975). Among his most enduring contributions to natural history was the recruitment of Albert Günther to his staff, opening the way for the Britain's Natural History

John Edward Gray (1800–1807).

Museum at last to begin catching up with the Museum National d'Histoire Naturelle in Paris, unarguably the greatest in the world at the beginning of Gray's career.

Green, E. E.

Edward Ernest Green (20 February 1861–02 July 1949), was born in Sri Lanka to John Phillip Green and Jane Mary Akers, who owned tea plantations in the island. Green was educated at Charterhouse, a prominent British public school, and in 1880 returned to Sri Lanka to train as a coffee planter and help manage his father's estates. The vast extent of coffee planted in Sri Lanka's central highlands was at the time being ravaged by the fungus *Hemileia vastatrix* (coffee leaf rust), a blight from which the crop never recovered, especially after the green bug (*Coccus viridis*) set in. After falling harvests led coffee planters to seek to bolster production by increasing the area under coffee throughout the 1870s (see p. 33), in the course of the 1880s, they began switching to tea. Despite the obvious impact on his own fortunes, Green devoted much of his time to studying these fungal and insect pests, especially with a view to preventing the burgeoning tea industry from succumbing to a fate similar to that of coffee.

In 1890 Green published his monograph, *Insect pests of tea* (making for himself a place in history as a pioneer in the study of tropical crop pests), which led the Planters' Association to appoint him as honorary consultant to the industry. In consequence, Green travelled throughout the tea planting districts of Sri Lanka and southern India, advising planters on methods of protecting their crops. So well known for the study of insects was he by then that he was commonly referred to by a nickname, Poochi Green (*poochi* being Tamil for insect). In 1891 he married Edith Mary Antram, who, like him, had been born in the colonies (in Kolkata). In 1897, the government appointed Green Honorary Entomologist, a

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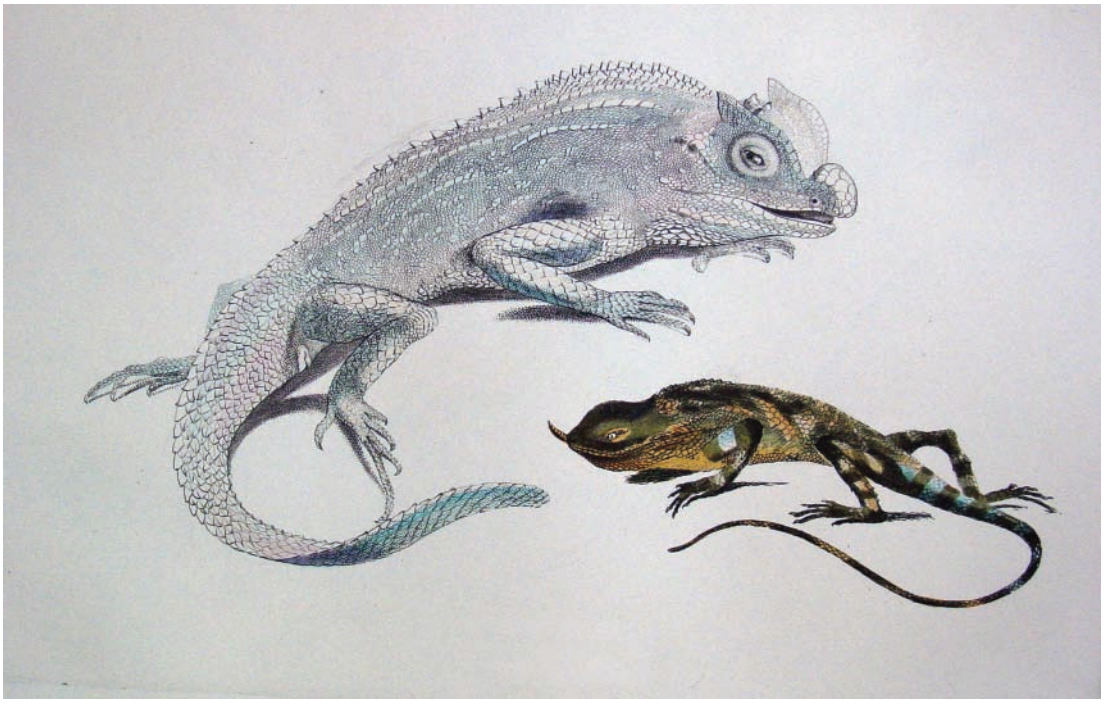
Opposite –

Above: Jungle fowl: Plate 43 of Volume 1 of J. E. Gray and T. Hardwicke's *Illustrations of Indian Zoology*. The bird figured in the centre is a female of the endemic Sri Lanka Jungle Fowl, to which Gray gave the name *Gallus stanleyi.* The book, however, was issued in 20 parts in the period 1830–1835, Plate 43 having been issued in April 1832. René Primevère Lesson (1794–1849) had, however, described the same species in his *Traité d'Ornithologie*, issued in April 1831, naming it *Gallus lafayetti*, which name therefore has priority over Gray's *stanleyi*.

Below: Sri Lanka's endemic highland horned lizard, *Ceratophora stoddartii*, received its name from this figure in *Illustrations of Indian Zoology* (no descriptive text was provided). *Lyriocephalus scutatus,* however, had already been named by Linnaeus in his *Systema Naturae* (1758), based on an earlier description and figure by Albertus Seba (*q.v.,* 1665–1736; see also figure on p. 211). The new name, *Lyriocephalus macgregorii,* provided by Gray with this illustration is therefore a 'junior synonym', and Linnaeus's *scutatus*, being older, has priority.

(See previous page for captions.)

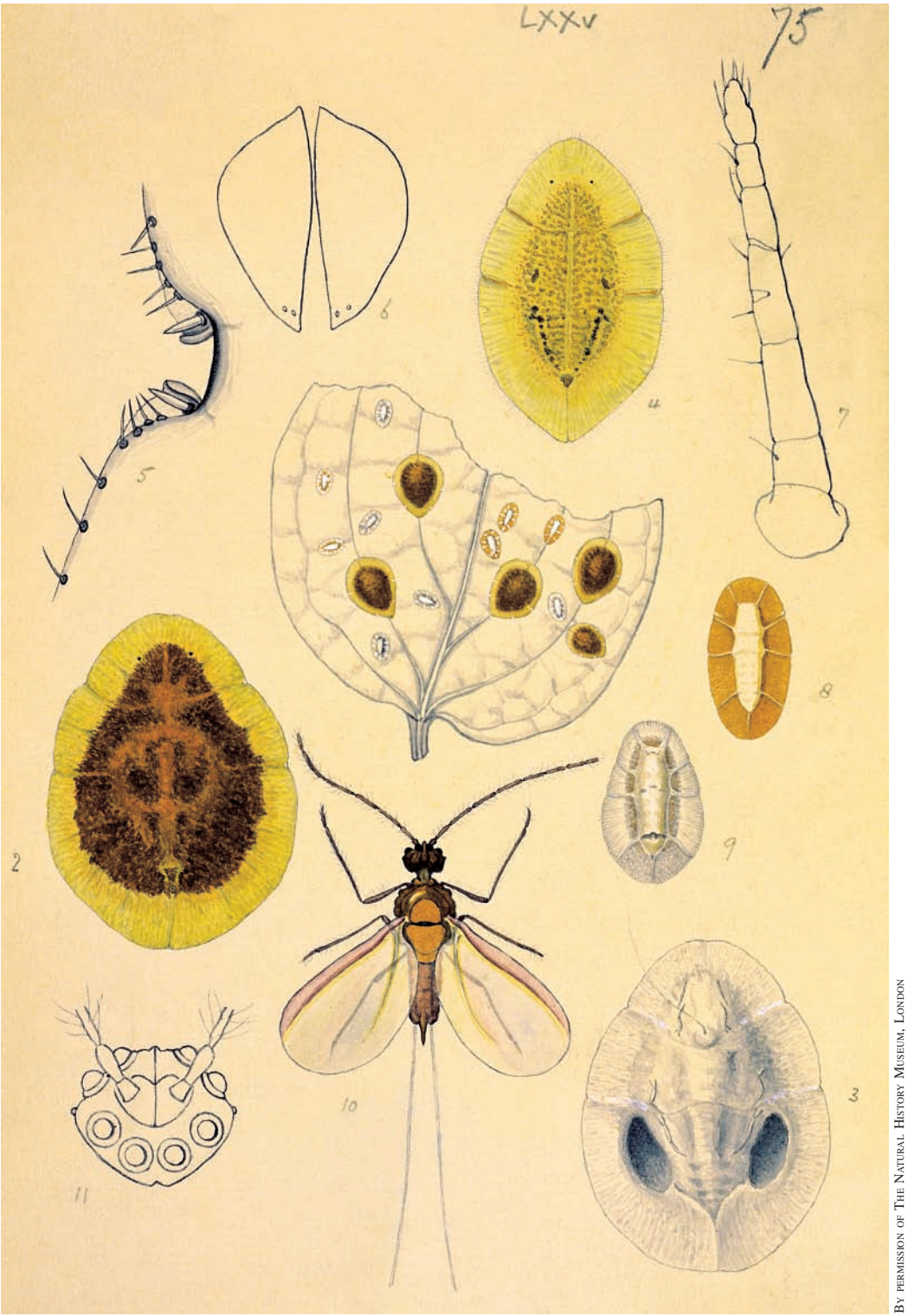


Courtesy of the Royal Entomological Society

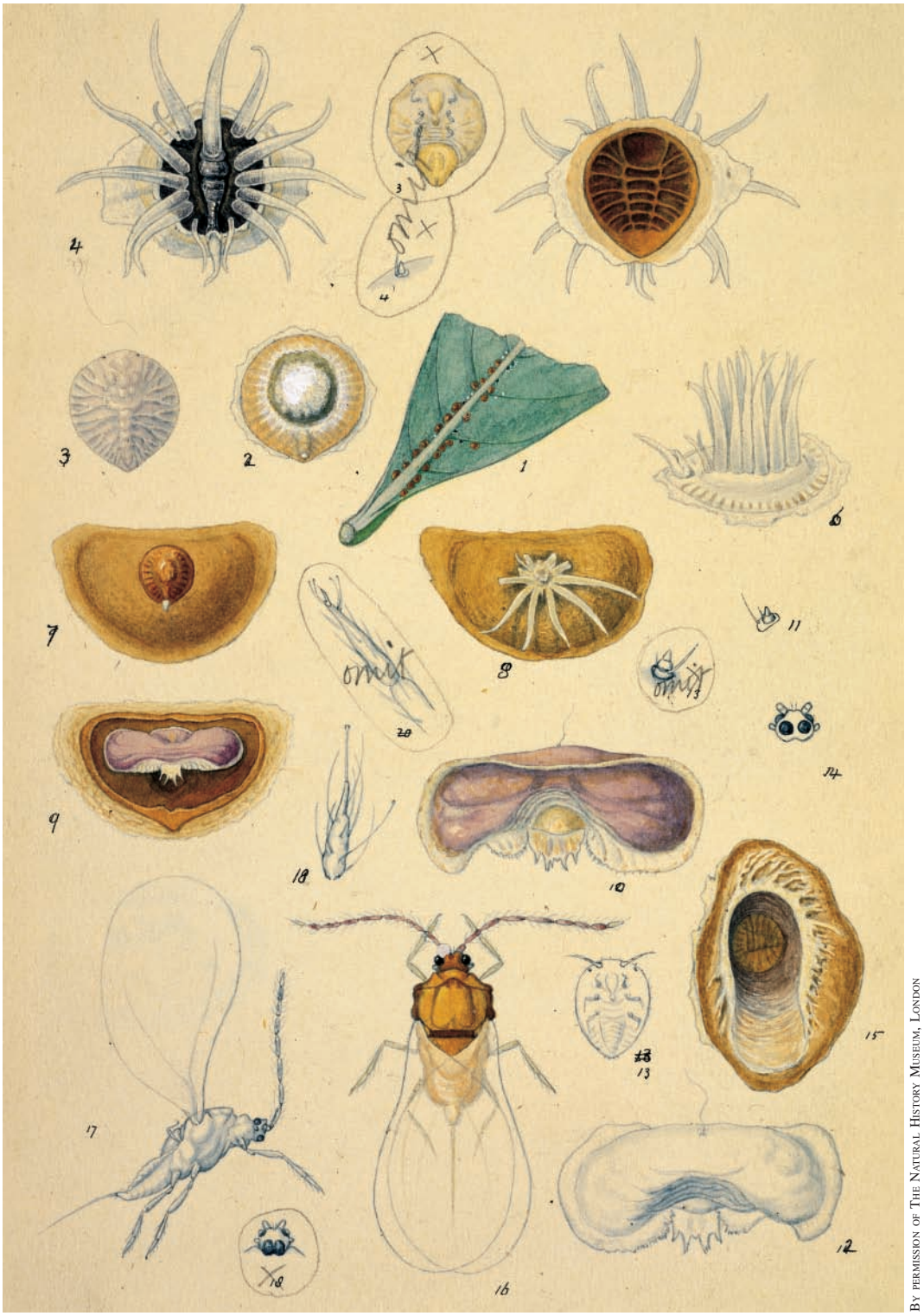
Following pages: T. D. A. Cockerell, in a review (1897) of Edward E. Green's *Coccidae of Ceylon* (1896–1922), wrote, "Until Mr. Green began to study Coccidae, the species of this family had never been collected or studied properly in any part of the great Oriental region, and for Ceylon only seven species had been recorded. Mr. Green has found considerably over a hundred, most of them new to science, and he estimates that over two hundred will eventually be found in the island." Green's book was reviewed also in *Science* by G. F. Ferris (1921), who noted that its was "by far the most ambitiously conceived and most admirably executed contribution to the knowledge of the Coccidae or scale insects that has ever been made." The figures on the following pages are from the collection of Green's original drawings in the Entomology Library of The Natural History Museum, London.

Left and below: Edward Ernest Green (1861–1949).

Courtesy of the Royal Entomological Society



By permission of The Natural History Museum, London



By permission of The Natural History Museum, London

distinction that was formalized in 1899 by his appointment as Government Entomologist, headquartered at the Royal Botanic Gardens, Peradeniya (Anon., 1949).

In his years as a planter in Pundulu Oya, Green gave in to his passion for natural history, collecting a wealth of animal specimens from all groups, ranging from insects to mammals, with particular emphasis on smaller species such as lizards and frogs. These were regularly dispatched to The Natural History Museum in London, where they were reported on by the leading taxonomists of the day, including Odonata by William Forsell Kirby (1844–1912) and Frank Fortescue Laidlaw (1876–1963).

Green himself published prolifically: as Government Entomologist from 1899–1913, despite being repeatedly afflicted by malaria, he published at least 245 papers (Laing, 1949), largely on systematic entomology (his total publications number at least 418). He was greatly assisted in his natural-history pursuits by being of independent means.

Green was also a pioneer in the field of biological control. In 1899, a collection of fungal pathogens of scale insects he had assembled was sent to Kew for identification by a pathologist. Earlier, Thwaites (*q.v.*) had laid the foundation for this field of study by collecting and identifying fungal-diseased insects, later treated in the classic work on this subject, Cooke (1892) (see also Evans, 1999). These early advances laid the ground for important strides in the study of entomopathogenic fungi by J. Parkin (1906) and T. Petch (1921).

Green retired to Camberley in Surrey, England in 1914, largely because he hoped this would prevent a recurrence of his malaria, from which he was by then severely debilitated. Here, in retirement, he became even more productive, reporting especially on the vast collections of scale insects (Coccidae) sent him by correspondents in Britain and many other parts of the world. Despite illness, he continued to publish until 1941, having in 1940 disposed of his beloved collection of coccids fearing (as it turned out, with uncanny foresight) that his laboratory might suffer from bombardment as World War II progressed.

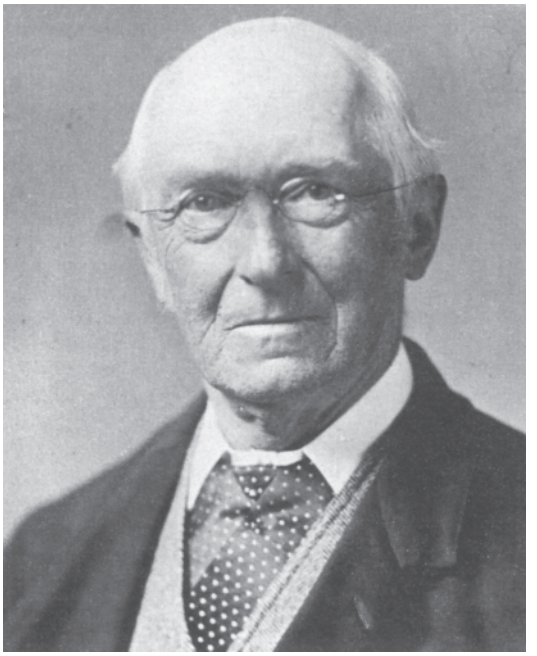
Green was a skilled artist, and used a brush (as opposed to a pen) even for the finest details. His drawings of coccids in the collection of The Natural History Museum combine excellent microscopy with accurate scientific illustration in a manner that at the same time enables his delineations to be used as a "field guide". Considering his limited formal education, Green's recognition by his scientific peers was underscored by his election as President of the Royal Entomological Society in 1923.

Green's *magnum opus* was his *Coccidae of Ceylon* (see illustrations on previous pages), which was published in five parts over a period of 26 years, the delay being in part caused by disruption of his work during the world wars. The work was reviewed by *Science* (1937, 54: 330), which remarked that it was "By far the most ambitiously conceived and most admirably executed contribution to the knowledge of the Coccidae or scale insects that has ever been made".

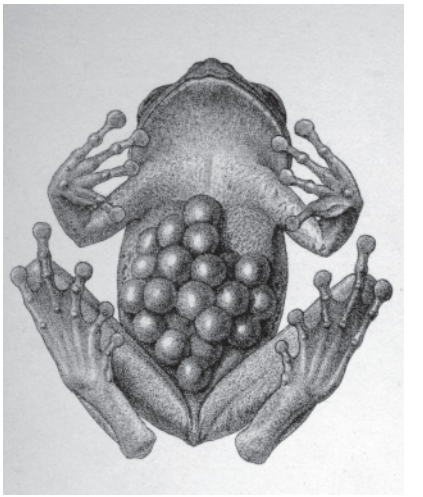
Günther, A. C. L. G.

Albert Carl Ludwig Gotthilf Günther (3 October, 1830–1 February, 1914) was arguably the most productive ichthyologist and herpetologist to have worked in Britain. Born in Württemberg (now in Germany), Günther took holy orders in 1851, but was gradually drawn to medicine. After receiving his PhD in 1853 he enrolled in medical school, receiving his MD from Tübingen University in 1857.

That same year Günther offered his services to John Edward Gray (1800–1875), then Keeper of Zoology at the British Museum (he was to succeed Gray as Keeper on the latter's death in 1875). Günther's prodigious output



Albert Garl Ludwig Gotthilf Günther (1830–1914).



"In a small collection of Ceylonese frogs submitted to my examination by Mr. W. Ferguson, F.L.S.," observed Albert Günther (1876), "there was a frog which I consider to be *Polypedates reticulatus*, and which had the ova attached to the abdomen when that gentleman obtained it. The ova are now detached, but still firmly adhere to one another, forming a flat disk." In noting thus, Günther had in fact discovered a new reproductive mode in frogs; his identification, however, was erroneous. Recent research (Meegaskumbura *et al*., 2007) has shown that this was a new species of frog, now named *Philautus maia*, that has since become extinct. The species is now known only from the specimen carefully preserved by Günther 130 years ago, and his illustration.

Illustration of the endemic highland lizard, *Calotes nigrilabris,* in Günther's *Reptiles of British India* (1864).

was unparalleled in the British Museum. Two of his works in particular (in addition to many papers), were to contain descriptions of all the fish, reptile and amphibian species then known from Sri Lanka: *Catalogue of the fishes in the British Museum* (1859–1870); and *Reptiles of British India* (1864).

Based on collections sent to London by naturalists including Kelaart (*q.v.*), Layard (*q.v.*), Ferguson (*q.v.*) and Thwaites (*q.v.*) in Sri Lanka, and others purchased from Cuming (*q.v.*), Günther described five new lizards and 10 new snake species in addition to a number of fishes, many of them endemic to the island. As was not uncommon at the time, Günther was entirely a 'museum scientist', and never ventured to the tropics, from where many of

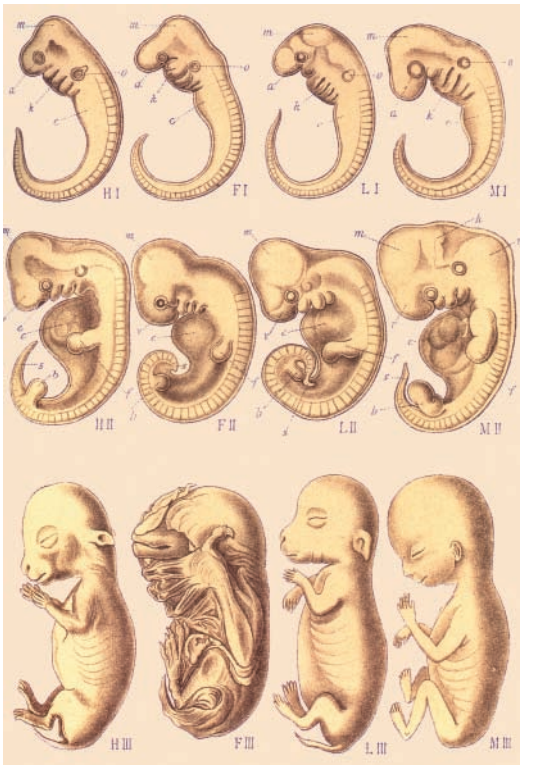
the species he described and catalogued so efficiently, came. Like Gray before him, Günther devoted considerable attention to building the museum's collections, with almost a million specimens being added during his tenure as Keeper. In 1865 he founded *Zoological Record,* which even today continues to serve as the most complete index of the world's zoological literature. In 1881 Günther hired a young Belgian, G. A. Boulenger (*q.v.*), who would continue with equal zeal the museum's tradition of zoological research.

Haekel, E. H.

Born in Potsdam, Germany, Ernst Heinrich Haeckel (16 February, 1834–11 August, 1919) grew up wanting to be a botanical explorer. He was, however, persuaded by his parents to take up medicine, in which he matriculated from Berlin, going on to study further at Würzburg. A field trip to Helgoland when he was 20, however, caused him to abandon botany in favour of the study of marine invertebrates. Although he qualified as a doctor in 1858, he never practised, and soon abandoned medicine in favour of a career as a biologist.

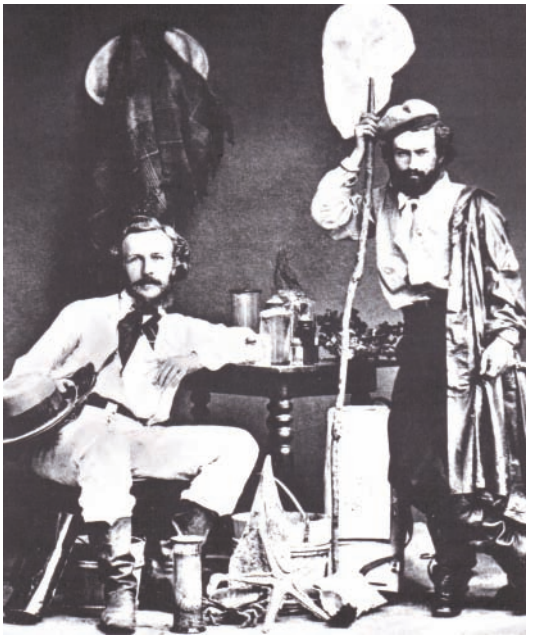
As a competent artist, Haeckel saw science in the context of art and poetry. He found an ideal candidate for his research in the Radiolaria, a group of protozoans, which were the subject of his 'habilitation' at the University of Jena in 1861, leading to his becoming an associate professor the following year. His interest in plankton was the result of a six-month stay in the Gulf of Messina, where he made an extensive collection, discovering some 120 new species of Radiolaria during this time. His reputation as an outstanding zoologist was established by the publication of *Die Radiolarien* the following year. He thus explained the genesis of his infatuation with this fauna:

> "A special passion for the most interesting branch of zoology: the lower orders of marine creatures, and above all, above all Zoophytes and Protozoa—to which [Johannes] Müller himself had directed my attention in Heligoland, in 1854—led me in the course of the next twenty years to visit the most dissimilar shores of Europe."



A figure from Haeckel's *Anthropogeny, or the development of man,* illustrating the similarity he perceived between the early embryonic stages of (left to right), dogs, bats, rabbits and humans. Through drawings such as these he sought to demonstrate that ontogeny reflects phylogeny.

On his 30th birthday, Haeckel suffered the death of his wife, Anna. In the aftermath of this bereavement he rejected the existence of a personal god (and therefore Christianity) and perceived an equivalence between nature and God, a theory he later expanded to 'monism'. Charles Darwin's publication of *Origin of the species* in 1859 (of which Haeckel read the German translation the following year) led to his becoming an articulate advocate of evolu-



Ernst Haeckel (1834–1919), with an explorer's paraphernalia and assistant, Nikolaus Miclucho-Maclav, in 1866.

Haeckel was able to convey an other-worldly atmosphere of perfection in his landscapes, such as this painting of ferns.

tion. Later, the two of them became regular correspondents, and Haeckel visited Darwin on at least two occasions.

In 1866 Haeckel published his two-volume treatise, *Generelle Morphologie*, in which he courted controversy by claiming that ontogeny recapitulates phylogeny: in other words, that the development of an embryo traces the evolution of that species. Were his contention true, it would enable the process of evolution of complex organisms to be observed 'live' in a short space of time and not over millions of years. Haeckel illustrated his thesis with side-by-side drawings of embryos of different species at various stages of development, drawing attention to the remarkable similarities between them. He did not treat scientific art as being merely representational or photographic, but saw the artist as an interpreter, with a duty to draw the attention of the reader to specific aspects of the illustration. His critics were thus not long in claiming (not without justification) that he had exaggerated his embryo drawings so as to support his claimed parallel between ontogeny and phylogeny (see p. 145).

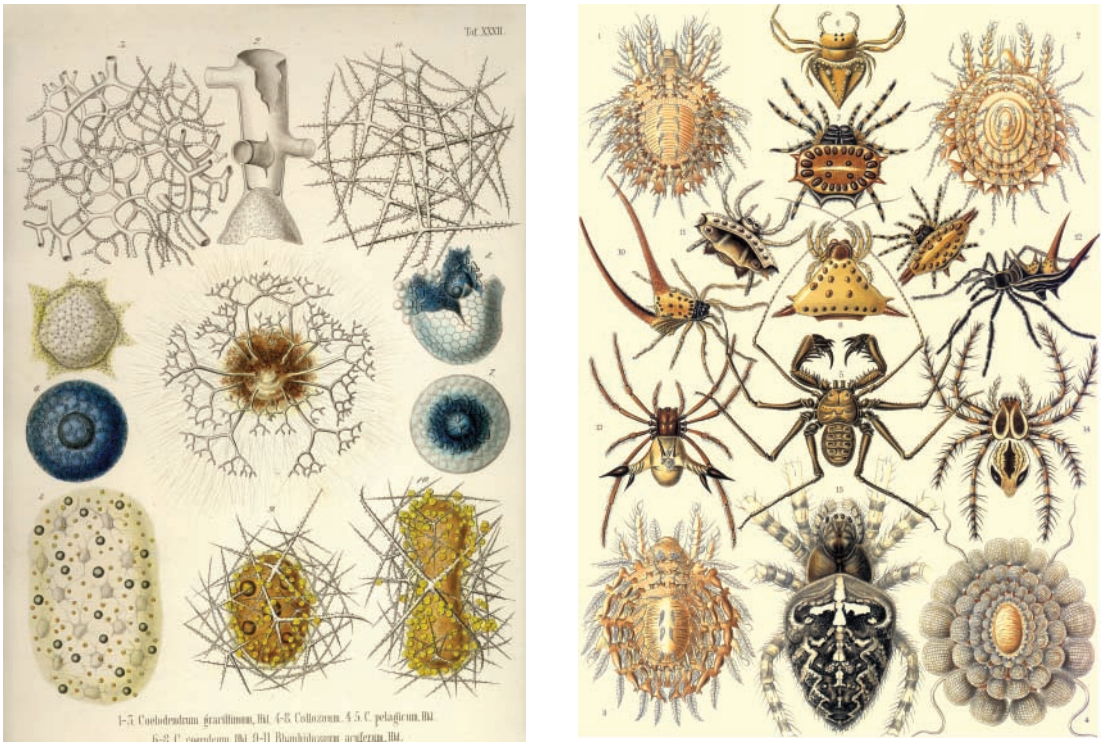
That, however, was not Haeckel's last brush with controversy. In 1868 he followed up with two less technical and enormously popular books, *Natürliche Schöpfungsgeschichte* [The natural history of creation] and *Anthropogenie* [The evolution of man]. In these, he unapologetically combined his ontogenetic and phylogenetic worldview with Darwinian evolution, largely by means of diagrammatic illustrations. Of few other scientists could the aphorism, 'A picture is worth a thousand words', be truer than of Haeckel.

In 1881 Haeckel undertook his first expedition to India and Sri Lanka, fulfilling the ambition of a lifetime. He intended on this tour, in addition to making collections for later study by himself and others, to observe his favourite organisms *in vivo*, and also to paint. Preparations for travel were meticulous:

Ernst Haeckel in explorer costume: Sri Lanka, 1881.

A talipot palm (*Corypha umbraculifera*) in flower, delineated by Haeckel in Sri Lanka, 1881.

"I then inspected, repaired, and completed the various instruments and apparatus for examining and collecting specimens, which always formed part of my paraphernalia in my voyages along the coast, and I added considerably to their number. I took advantage of the summer months to learn and practice various arts which I deemed might prove especially useful and desirable on this journey—such as oil-painting, photography, the use of a gun, of nets and traps, soldering metal, etc. ... In fact, no less than sixteen trunks and cases were shipped at Trieste as my luggage. Two of these were filled with books—none but the most necessary scientific works; two others contained a microscope and instruments for observations in physics and the study of anatomy. In two other cases I had apparatus for collecting and materials for preserving specimens; soldered tins containing different kinds of spirit and other antiseptic fluids, carbolic acid, arsenic and the like. Then two cases contained nothing but glass phials—of these I had some thousands—and two more were packed with nets and appliances of every kind for snaring and catching the prey; trawls and dredging nets for raking the bottom of the sea, sweeping and landing nets for skimming the surface. A photographic apparatus had a chest to itself, and one was filled with materials for oil and water-colour painting, drawing and writing; another was packed with a nest of forty tin cases, one inside the other, and so arranged that when I should have filled one with specimens I could myself easily solder down the flat tin lid. Then another contained ammunition for my double-barrelled gun—a thousand cartridges with different sizes of shot. Most of these fourteen cases were covered with tin and soldered down in order to protect their contents from damp, come what



Haeckel's venerated symmetry in zoological art, as these drawings of plankton (left) and arachnids (right) suggest, leading critics to allege that he permitted aesthetics to override scientific accuracy.

> might, during the long sea voyage. Finally, in two tin trunks I had clothes and linen to last me during my six months' wanderings."

Haeckel's travelogue, *Indische Reisebrief* [Indian travel-letters], which was destined to run into several editions, was published in 1882, followed the next year by *A visit to Ceylon* and *India and Ceylon*, in English. This rhapsodic account of his travels truly paints Sri Lanka as the paradise isle: there is no mention of a single misfortune, accident or unpleasantness of any kind. From the moment of his arrival in Colombo on 21 November, 1881 and until his departure on 11 March the following year, he was evidently treated with extraordinary kindness by everyone with whom he came into contact, and makes no mention of the slightest inconvenience or discomfort. Given that he visited some of the most difficult and inaccessible parts of the island at the time, his account speaks volumes for his tolerance and good humour. So much so that a contemporary reviewer in *Science* (47: 825–6, 1883) observed, "So full of pleasure and good fortune is the whole trip, that the reader soon grows weary, and wishes that some slight accident might happen, to break the monotony."

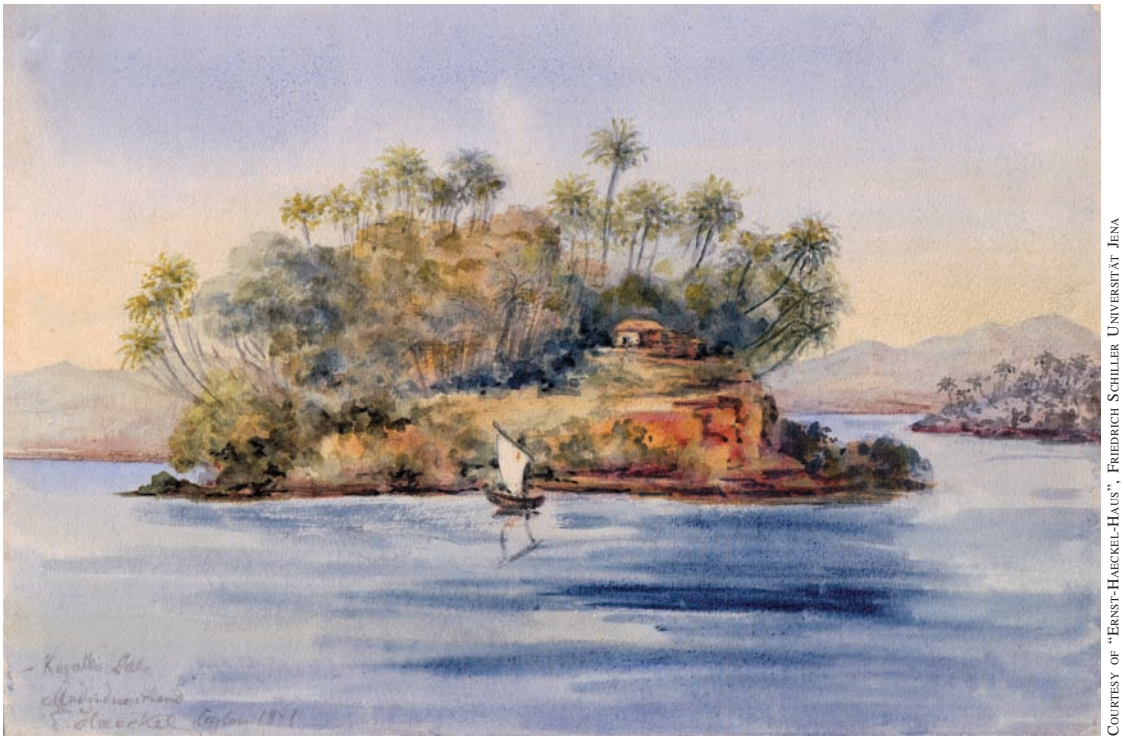
Among the few observations he made that could be interpreted as being critical is the following account of the ongoing destruction of rainforest to make way for coffee plantations at the time of his visit.

> "In 1825, that enterprising Governor, Sir Edward Barnes, formed the first coffee plantation in the hill country, in the neighbourhood of Peradeniya, and proved that the soil and climate there were especially favourable to the cultivation of the berry. Encouraged by his example, and spurred to energy partly

Courtesy of "Ernst-Haeckel-Haus", Friedrich Schiller Universität Jena

Weligama Bay, 1881, by Ernst Haeckel.

Prints from Ernst Haeckel's (1905) *Wanderbilder nach eigenen Aquarellen und Ölgemälden*. Above, *Ficus* trees in the garden of Whist Bungalow (his residence while in Colombo); below, Kelani Ganga, 2 February, 1882.



Courtesy of "Ernst-Haeckel-Haus", Friedrich Schiller Universität Jena

"Medindua Island" on Koggala Lake, by Ernst Haeckel, 1881.

> by the hope of large profits and partly by the romantic adventurous life in the wilderness, a perfect army of coffee-planters invaded the hill forests of Ceylon, and in less than twenty years had, by axe and fire, transformed the larger part of it into profitable plantations. Whole forests were annihilated on the steep slopes by the plan of cutting down the upper ranks of the gigantic trees, and so felling them on to those below, which had been half cut through on the upper side. The enormous weight of these dense masses of vegetation, bound and tied together with creepers, uprooted the trees below, and the whole wood crashed and slipped like an avalanche down into the valley. The mass was then set on fire, and this burnt soil was found excellent for the coffee shrub."

In Sri Lanka, Haeckel also met up with colleagues involved in natural history studies. "From Kandy", he wrote, "I made an excursion with my two botanical friends, Dr. Trimen and Dr. [Marshall] Ward, to Fairyland, a few miles farther, to visit Dr. Trimen's predecessor, Dr. Thwaites. He was director of the botanic garden of Peradeniya for 30 years, and retired a few years before his death to enjoy his well-earned leisure in the peaceful solitude of the hill country. His little bungalow lies quite hidden in an elevated ravine about eight miles south of Kandy, in the midst of coffee plantations."

From the point of view of science, however, it was during his six-week stay at Weligama, starting 12 December, 1881, that Haeckel made the natural history observations and collections that most interested him: "My zoological collection in Belligam [Weligama] soon considerably increased; and if I brought home a richer store of materials to work on than I have any hope of exhausting in all the remaining years of my life, I owe it principally to the indefatigable exertions of

my faithful Ganymede [the Weligama *arachchi* Abeyweera]." Even here he was only mildly inconvenienced by the excessive humidity and the insects that attacked his collections.

In 1900 he undertook a further journey to Sri Lanka, going on thereafter to Singapore, Java and Sumatra (Hoßfeld, 2004). While he did pursue collection-making during these travels, Haeckel treated his visits to Asia essentially as recreational, and his paintings from the period have proved to be historically important not only because of their scientific content and artistic value, but also because of the contemporary subjects he chose to depict, albeit in his unique style.

Hagenbeck, J.

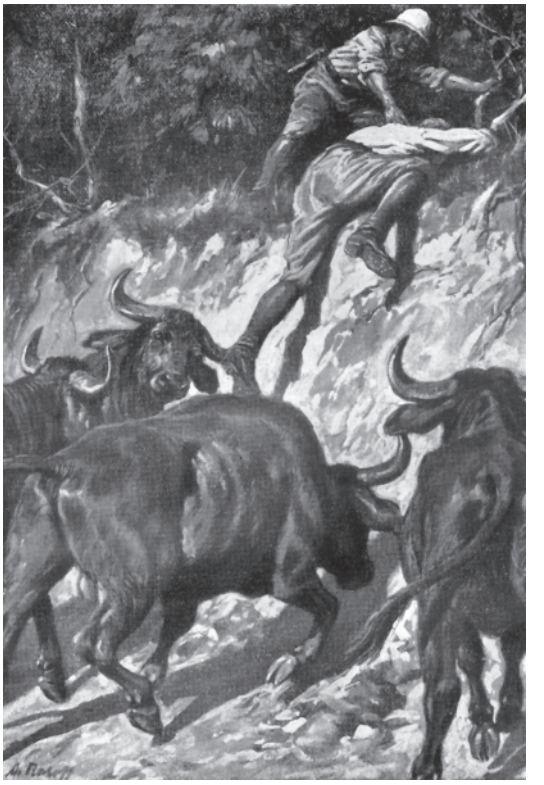
John Hagenbeck (1866–1940) was the half-brother of Carl Hagenbeck (1844–1913), the founder of the Hamburg Zoo. The Hagenbecks' father had maintained a small menagerie for exhibition, and the boys grew up amongst the animals. Carl took over their father's business in 1866, and became, through trade and innovative breeding programmes, the leading animal dealer in Europe. Hagenbeck's zoo became the pioneer of two trends in the zoo world: animals trained to perform by benign means rather than threats and punishments; and animals displayed in open-air surroundings similar to those of the wild, rather than in iron cages. From the 1880s onwards, Carl introduced an ethnographic element into his shows, starting with a "caravan" of Sri Lankans by way of an exhibit (Rothfels, 2002). "One of the largest of all my ethnographic exhibitions," Carl wrote (1910),

> "was the great Cingalese exhibition of 1884. This great caravan, which consisted of sixty-seven persons with twenty-five elephants and a multitude of cattle of various breeds, caused a great sensation in Europe. I travelled about with this show all over Germany and Austria, and made a very good thing out of it."

In his autobiography, Carl also explained the genesis of the family's association with Sri Lanka. "The end of the year 1880 brought me some relief from my financial anxiety", he wrote.

> "My faithful friend Barnum sent me huge orders for elephants. Barnum and another American names Forepaugh were at this time strenuous competitors in the circus world, and the American public seem to have had a special predilection for elephants. At all events, elephants were the chief attraction and the fact was very fortunate for me. The only difficulty was to find enough of the quadrupeds. I therefore sent one of my most famous travellers, Joseph Menges, to Ceylon in order to ascertain the prices of elephants in that island, and to find out whether large numbers of the creatures could be obtained there. Menges' reports were most satisfactory, and before long both he and certain other of my travellers were hard at work exporting a continuous stream of elephants from Ceylon. I was perpetually receiving fresh orders not only from Barnum but also from Forepaugh, for the rivals were continually endeavouring to overtrump each other in this manner, and in the year 1883 I exported from Ceylon no fewer than sixty-seven elephants."

Following on Menges' initial explorations, John Hagenbeck came to Sri Lanka in 1886 as a youth of 20, to found an export business for Sri Lankan animals for the European pet trade, zoos and museums. His business soon developed branches also in India and Indonesia. John became a successful businessman and plantation owner, and prospered until the outbreak of World War I, when he fled to Germany to escape internment by the British as an enemy alien (a passage he immortalised in his 1917 *John Hagenbecks abenteuerliche Flucht aus Ceylon*). After the war, he returned to Sri Lanka to resume his business and in the late 1920s developed a large menagerie-cum-export depot at Dehiwala, in Colombo's



Despite his family pioneering the modern 'humane' zoo, John Hagenbeck's (1922) *Fünfundzwanzig Jahre Ceylon: Erlebnisse und Abenteuer im Tropenparadis* ('Twenty-five years in Ceylon: Experiences and adventures in a tropical paradise') portrayed wild animals uniformly as both dangerous and aggressive. As these illustrations from the book show, Hagenbeck appears to have been barely able to set foot outside of the city without being attacked, encounters from which he emerged largely unscathed, however, rarely needing actually to kill any of his assailants in his own defence.

Other European explorers in Sri Lanka, including the Sarasin cousins, Ernst Haeckel and Hagenbeck's own successor, Heinz Randow, author of *Auf Tierfang in Ceylons Dschungeln und Gewässern* ('On animal capture in Ceylon's jungles and swamps', 1950), appear to have led charmed lives by comparison. Having traversed the entire island on foot in the course of five visits in the period 1883–1925, for example, Fritz Sarasin was unable to report a single untoward incident in his 1939 travelogue, *Reisen und Forschungen in Ceylon*. Even Ernst Haeckel, who travelled almost as widely in the island, described his experience of the Sri Lankan wilderness as one of unremitting bliss.

southern suburbs. At the outbreak of World War II, however, he was not as fleet of foot as he was at the commencement of the previous war; he was arrested and interned, during which period he died. His animal depot, facing bankruptcy, was taken over by the government to become what are now the National Zoological Gardens.

John is probably best remembered by his 1922 book, *Fünfundzwanzig Jahre Ceylon: Erlebnisse und Abenteuer im Tropenparadis* ['Twenty-five years in Ceylon: Experiences and adventures in a tropical paradise']. This extremely popular volume was translated into several European languages (except English, for the reason, it was unkindly said at the time, that the author did not want his literary excesses understood by Colonial Sri Lanka's English-speaking elite). Nevertheless, his writing captivated a generation of German scientists, collectors and travellers, inspiring them to visit and work in Sri Lanka. He was followed at Dehiwala by Heinz Randow, who wrote a rather more credible (1950) *Auf Tierfang in Ceylons Dschungeln und Gewässern* ['On animal capture in Ceylon's jungles and swamps'], later published in English as *Zoo search in Ceylon: capturing rare creatures in Ceylon's jungles and swamps* in 1958. At Dehiwala, Hagenbeck and Randow operated a thriving business, importing animals from Southeast Asia and exporting these, together with collections from Sri Lanka, to Europe. The quantities of imports were formidable: "Among the new arrivals", Randow noted of one shipment, "were splendid specimens of parrots, cockatoos and lories. In addition there were monkeys of every description, a large pair of black-and-white tapirs, ten black panthers, six almost fully grown tigers, twelve cassowaries, some rare pheasants... One afternoon a shipment of five hundred rhesus monkeys arrived from Calcutta."

Then, of the beginnings of the ornamental fish export trade: his fishing net, wrote Randow,

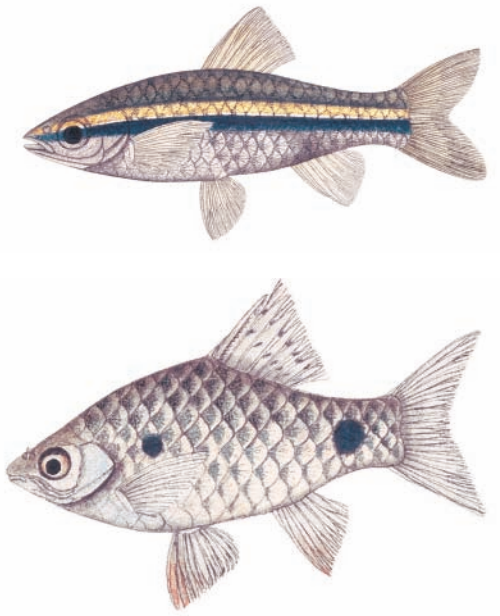
> "was a most useful piece of equipment, and I was always using it in my researches into the various species to be found in the waters round about. At every catch I would sort out the smallest fish, the so-called ornamental fish seen in tropical aquaria, in the hope of discovering new species, and then ship them off in tanks to Europe to scientific laboratories and to dealers in tropical fish."

Hamilton [Buchanan], F.

Francis Buchanan (1762–1829) was born in Branziet, Scotland and educated at Glasgow University, after graduating at which he studied medicine at Edinburgh. In 1785 he voyaged to India, and in 1789 undertook a second tour, this time taking in Sulawesi (then Celebes) and the Philippines. He joined the Indian Medical Service of the Honourable East India Company in 1794 as an Assistant Surgeon, and was by 1796 collecting both plant and animal specimens (Prain, 1905), in due course becoming Superintendent of the Calcutta Botanic Gardens. On his retirement in 1816 he returned to Scotland, where the death of his brother caused him to inherit a sizeable estate and perforce assume their mother's surname, Hamilton, in 1818 (references to him as Hamilton-Buchanan in the literature are therefore inaccurate; he was never known by such a name in his lifetime). Hamilton's relevance to Sri Lankan natural history derives from his *Fishes of the Ganges* (1822) in which he described and named the rich fish fauna then known from that river system. Many of these nominal species are represented throughout the lowlands of the Indian peninsula, several occurring also in Sri Lanka (Gudger, 1924; Hora, 1929).

Hampson, G. F.

George Francis Hampson (14 January, 1860–15 October, 1936) was in the 1880s a tea planter in the Nigiri Hills in Tamil Nadu, India. While there, Hampson became interested in Lepidoptera and amassed a large collec-



Original illustrations of *Rasbora daniconius* and *Puntius ticto* drawn for *Fishes of the Ganges* (1822) by Francis Hamilton (1762–1829).

tion of Indian and Sri Lankan specimens. Having been educated at Charterhouse and Exeter College, Oxford (an unusually academic background for a planter), Hampson was well equipped to undertake an independent career in entomology. In 1889 he returned to England and, being of independent means, worked as a volunteer in the British Museum (Natural History), writing *The Lepidoptera of the Nilgiri District,* which he published in 1891. He followed this with *The Lepidoptera Heterocera of Ceylon* (1893), in which the type specimens of this group of moths were for the first time catalogued and illustrated.

While writing these two monographs, Hampson undertook to write up the moths for *Fauna of British India* (including Sri Lanka), which he published in four volumes in 1892–96. In this 2,276-page work, he not only described all the known species, but hundreds of new ones. With regard to the Sri Lankan moths, however, Hampson had able helpers *in situ*. "The Ceylonese fauna is perhaps the one that has been the best worked," he wrote in his (1892) preface to *Fauna of British India*,

> and the only one where any large study of the earlier stages has been made; the collections of Dr. Thwaites, and the earlier collections of Messrs. Mackwood, E. E. Green, and many others, were all described by Mr. Moore in his 'Lepidoptera of Ceylon,' and the drawings of the larvae figured by him; whist the later collections of Messrs. Mackwood, Green, Butt, and others, all now in the British Museum, have been described by myself in the part of the 'Illustrations of Heterocera' to be shortly issued.

As a result of his industry, Albert Günther (*q.v.*) offered Hampson a position in the Museum, and in March 1895, he was appointed Assistant in Entomology. In 1896 Hampson inherited a baronetcy, acquiring the prefix, 'Sir', greatly adding to the department's prestige. Partly as a result of his elevation to the peerage, but mainly for his prodigious taxonomic output, Hampson was in 1901 made Acting Assistant Keeper of the museum. That served only to increase his productivity, and soon he was working on *Catalogue of the Lepidoptera Phalaenae in the British Museum*, published in 13 volumes (1898–1913), with supplements issued in 1914 and 1920.

Hampson's prodigious output, according to his colleague Norman Denbigh Riley (1890–1979), was "achieved by a ruthless methodical routine with which nothing was allowed to interfere, standing day long at the high desk which was his only work bench and on which the only tools, pen, pencil, dividers, benzene and a hand lens were arranged" (Stearn, 1981).

The Natural History Museum's Entomology Library contains Hampson's manuscripts, which include some 1,000 drawings of moths he prepared for his monographs.

Thomas Hardwicke (1756–1835).

Hardwicke, T.
Major-General Thomas Hardwicke (1756–1835) was perhaps the greatest collector of natural history drawings in India, being the first also to depict the Ceylon Jungle Fowl (*Gallus lafayetti*) and the horned lizard (*Ceratophora stoddartii*) in his *Illustrations of Indian Zoology* (1830–35), for which the text was provided by J. E. Gray. Hardwicke was a keen naturalist, serving also as Vice-President of the Asiatic Society of Bengal from 1820 to 1822 (Archer, 1962), having become a Fellow of the Royal Society in 1813. While serving in the Bengal Artillery from 1755–1835, he commissioned both British and native artists to depict in life almost every animal that came to their attention, in many cases taking care also to preserve the skins. In addition to the 200 published in *Illustrations of Indian Zoology*, some 1,300 are in the collection of The Natural History Museum in London, and a further 96 at the India Office Library (Dawson, 1946; Kinnear, 1925), including a number of Sri Lankan species, the provenance of which is unknown.

Hardwicke did, however, visit Sri Lanka in 1815, taking in also the newly-established botanic garden at Kalutara. "It is a small spot on the borders of an extensive lake", he wrote Joseph Banks,

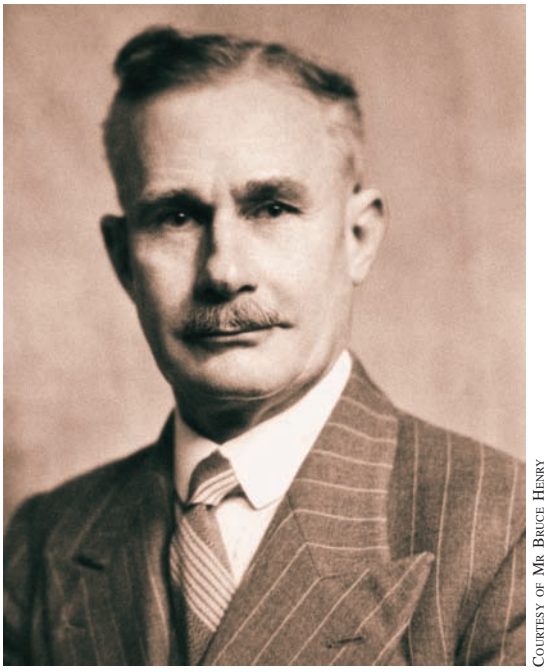
> "but in a situation very flat and not sufficiently elevated above the surface of the water for the purpose of a garden. For a short time plants placed here thrive, but when the rots extend below the insufficient thickness of dry soils their growth is checked and the greater part gradually decay and perish."

Hartlaub, G.
Gustav Hartlaub (1814–1900) was a physician who was also Honorary Supervisor of the Zoological Collection of the Bremen Natural History Society's museum. He wrote extensively on the birds of Africa, Madagascar and Polynesia, and, though he evidently never visited the island, published the first account of the ornithology of Sri Lanka (Hartlaub, 1854), a work of slight importance which introduced little new information.

Henry, G. M. R.
George Morrison Reid Henry was born in Sri Lanka on 1 February, 1891. The son of an impoverished tea planter, Henry spent his early years in Melbourne, Australia, returning to Sri Lanka in 1897. He was employed as draughtsman and laboratory assistant to the Ceylon Company of Pearl Fishers in 1907, where he became acquainted with Joseph Pearson (19 April, 1881–20 June, 1971), the Government Marine Biologist, who was to be director of the Colombo Museum from 1910–1933. In 1913 Pearson invited Henry to join the Museum's staff, offering him the especially created post of Assistant in Systematic Entomology. Henry had little formal education and no training in entomology: however, his enthusiasm for natural history, combined

with Pearson's patronage, sufficed to win him an appointment. An additional incentive for the Museum to appoint Henry was that the influential Government Entomologist, Ernest Green (*q.v.*), was due to retire to England, and he was anxious that his extensive collections at the Museum should be well cared for and researched.

Henry was sent to the Indian Museum in Calcutta, where he trained under Nelson Annandale (1876–1924), its director. He then took up the post of Acting Assistant Entomologist to the Department of Agriculture in 1915, joining Thomas Petch (*q.v.*, 11 March, 1870–24 December, 1948), the Government Mycologist. Like Ernest Green, Petch too, was an amateur biologist with no formal training, and Henry fitted enthusiastically into his new job, being assisted by Edwin de Alwis, Harmanis de Alwis's grandson (see p. 76).



COURTESY OF MR BRUCE HENRY

G. M. R. Henry (1891–1983).

COURTESY OF MR BRUCE HENRY

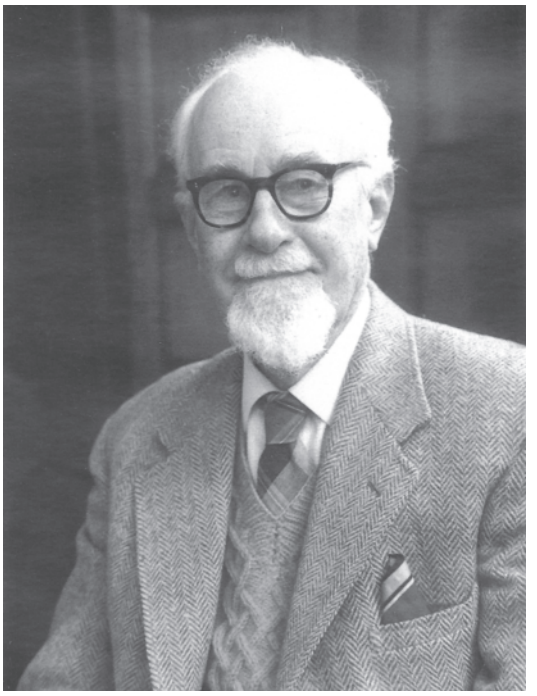
Salticid spider (*Myrmarachne* sp.): a microscope study by G. M. R. Henry.

COURTESY OF MR BRUCE HENRY

Ant-mimicking spider (*Siler semiglaucus*)....

COURTESY OF MR BRUCE HENRY

... and the ant it mimics: microscope studies by G. M. R. Henry.



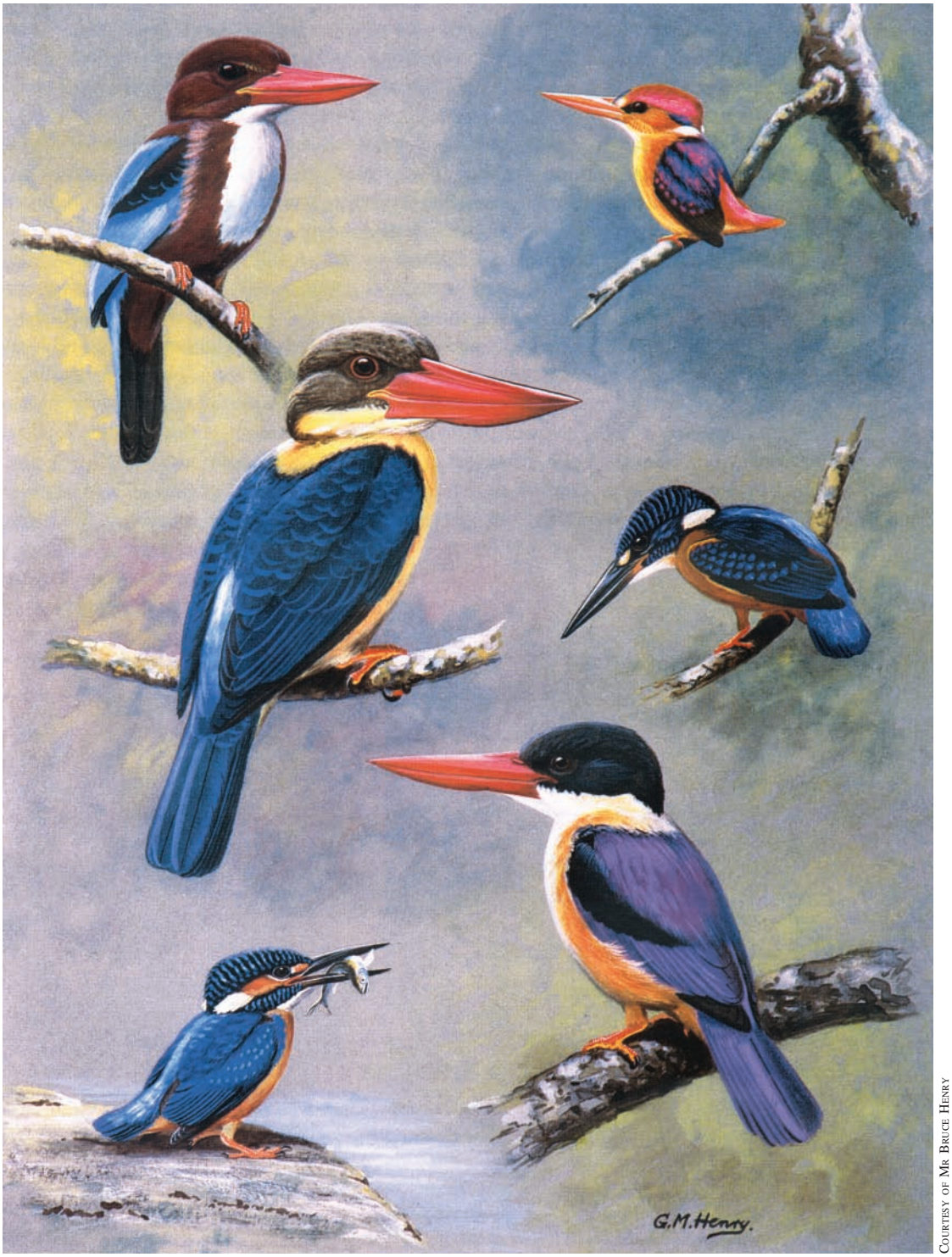
COURTESY OF MR BRUCE HENRY

G. M. R. Henry, *ca* 1975.

Henry's most enduring entomological contribution was his revision of the orthopteran family Tettigoniidae for the *Fauna of British India*. He had for many years worked also on the Orthoptera, but abandoned this project when he had to leave Sri Lanka. During the war years, Henry took to painting the birds of Sri Lanka with the intention of publishing them in book form once the economic climate improved. Sadly, this was never to be.

In 1920 Henry visited England for the first time, where at the instigation of W. E. Wait (*q.v.*) he met the ornithologist E. C. S. Baker (*q.v.*), who was yet to publish his eight-volume set on the birds in the *Fauna of British India Series* (Baker, 1922–30). On his return to Sri Lanka an year later, Henry continued his work both in systematic entomology and ornithological illustration. A watershed was the visit to Sri Lanka in 1924 of Casey Albert Wood (1856–1942), an ophthalmologist turned ornithologist-*cum*-bibliophile, who commissioned Henry to produce a set of life-size plates of the birds to be published in Wait's *Manual of the birds of Ceylon* (1931). Wood was thereafter in many ways a mentor to Henry.

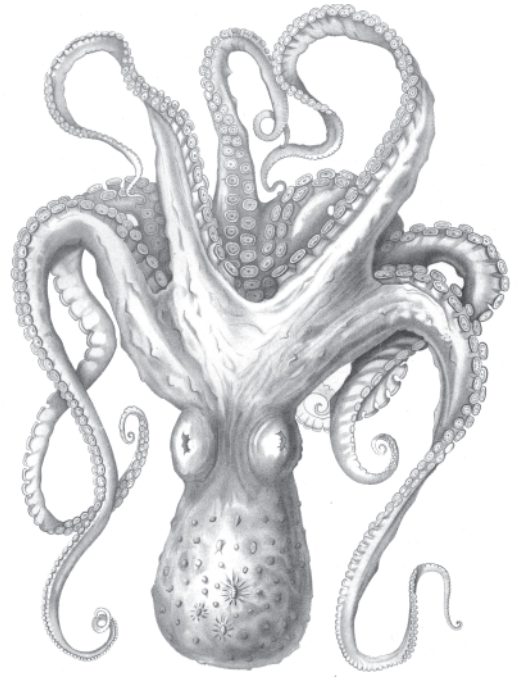
By 1946, with the Museum now under its first Sri Lankan director, P. E. P. Deraniyagala (*q.v.*), Henry opted to retire prematurely. Deraniyagala made no secret of his contempt for 'this uneducated Englishman' and Henry became increasingly ill at ease (though his memoirs belie his bitterness: "As soon as the war ended and realising that under a Sinhalese dominated Government and Deraniyagala's Directorship, the future of Ceylon held nothing for me…" (Henry, 2000)). Having retired to England, he became a lay preacher but continued to write and draw, for example, contributing six plates to Ali & Ripley's *Handbook of the birds of India and Pakistan* (1983), until his death on 30 June, 1983. His best remembered work however, remains *A guide to the birds of Ceylon* (1955), several times reprinted and now in its third edition.



Courtesy of Mr Bruce Henry

Kingfishers: a plate from G. M. R. Henry's *A guide to the birds of Ceylon.*

The Ceylon Pearl Oyster Fisheries Project resulted in the discovery of hundreds of new species of marine invertebrates, such as these sponges described by J. A. Thomson and W. D. Henderson in 1905.



Polypus herdmani, a new species of octopus from the Gulf of Mannar discovered in the course of collections made for the Pearl Oyster Project, and named for W. A. Herdman by W. E. Hoyle in 1904.

Herdman, W. A.

William Abbott Herdman (1858–1924) set out to be a physician, studying medicine at Edinburgh University, but later switched to zoology. In 1881, at the age of just 23, he became the Derby Professor of Natural History at Liverpool University, where he remained for the rest of his working life. Herdman, an acclaimed marine biologist, was put in charge of the tunicate collection amassed by the *Challenger* expedition of 1872–76, on which he published a series of reports. In 1892 he established (and helped fund from his own resources) the marine research station at Port Erin on the Isle of Man, which remained part of the University of Liverpool until 2006. Despite his philanthropy and amazing scientific productivity, Herdman's life was tragic: he was twice married and widowed, and in 1916 his only son, aged just 21, was killed in France during World War I.

Herdman was keenly interested in margarosis—the formation of pearls—and in 1900 was commissioned by the Colonial Office to report on Sri Lanka's pearl fisheries, which had for decades been declining, with a view to reviving them. In 1901 he spent three months in Sri Lanka, collecting material which he farmed out among a number of colleagues on his return to England. James Hornell (*q.v.*) served as his assistant and remained in Sri Lanka for several years, to complete the field work. During Herdman's months he Sri Lanka, he was fortunate to meet with a number of important scientists also in the island at the time, including the cousins Paul and Fritz Sarasin (*q.v.*), J. C. Willis (*q.v.*) and Alexander Emanuel Agassiz (1835–

1910), who had previously served as curator of the Museum of Comparative Zoology, Harvard (1874–85) and also as President of the US National Academy of Sciences.

The result of Herdman's study of the pearl fishery was his *Report to the Government of Ceylon on pearl oyster fisheries of the Gulf of Manaar* (1903–05; see also p. 28). The five volumes and 1,500 pages of this massive work probably constitute the greatest single natural-history study ever undertaken in the country. (It was Herdman who first posited that margarosis was not a result of irritation by particles such as sand—as believed, for example, by Kelaart—but a consequence of infestation by the parasite *Tetrarhynchus unionifactor*, to which the pearl oyster *Margaritifera vulgaris* is an intermediate host, the final host being the Great Ray, *Rhinoptera javanica*, which in turn preys on the oyster.) Herdman was knighted in 1922, and died of a heart attack two years later, aged just 66.

Holdsworth, E. W. H.

Edmund William Hunt Holdsworth (1829–1915) was a marine biologist who worked in Sri Lanka in the period 1865–71, prior to which he served (1863–65) as secretary to the Sea Fisheries Commission in England. He made extensive collections of marine invertebrates in Sri Lanka, some of which he worked on himself (e.g., Holdsworth, 1872), and others of which he caused to be deposited at the Natural History Museum in London (e.g., Bowerbank, 1873). While in Sri Lanka, Holdsworth made an intensive study of the island's bird life, and shortly after his return to England published his *Catalogue of the birds found in Ceylon* (1872), in which he listed the 323 species he collected in the island, including two endemic new species from the central mountains, *Zosterops ceylonensis* (the Sri Lanka Hill white-eye) and *Arrenga blighi* (the Sri Lanka Whistling thrush). He considered 36 of the 323 species to be endemic to Sri Lanka.

Courtesy of The Linnean Society of London

E. W. H. Holdsworth (1829–1915).

It was Holdsworth too, who first described the geographical distribution of bird species within the island, giving detailed locality information.

Holdsworth was better known, however, for his books on fisheries, which included *Deep sea fishing and fishing boats* (1874), *Sea fisheries & salmon fisheries* (1877, with Archibald Young), and *The sea fisheries of Great Britain and Ireland* (1883).

Hornell, J.

Born in Scotland in 1865 (*d.* 24 February, 1949), James Hornell schooled in Kirkcudbright and then at the University College, Liverpool, where he was a student of the zoologist and oceanographer W. A. Herdman (*q.v.*). In 1891 Hornell moved to Jersey, where he married, and lived for ten years, continuing to publish on natural history. In 1900, Herdman invited Hornell to travel to Sri Lanka as his assistant, for a study he had been commissioned to make, of the pearl fisheries.

While Herdman stayed on the island only long enough to make an initial investigation, Hornell was to remain for six years, during which time he was extremely active in marine exploration and research not just in the Gulf of Mannar (the main area of the research), but all around Sri Lanka.

In 1904 he was appointed Marine Biologist to the government of Sri Lanka and also made Inspector of Pearl Banks. In 1907 Hornell resigned his post with Sri Lanka's colonial government and took up employment at Chennai (then Madras), eventually being appointed as Director of Fisheries, a post he retained until his retirement in 1924. During his time in Sri Lanka and India, he published extensively on the biology of several groups of marine organisms, and also on the management and organization of fisheries.

In his retirement Hornell travelled widely: no area of the maritime world appears to have escaped his attention. He was drawn increasingly to research on the history and development of water craft, about which he accumulated a wealth of data. He published several books and more than 40 papers on this subject, documenting for the first time also the history and development of the water craft of Sri Lanka (Harrison, 1949).

Humbert, A.

Aloïs Humbert was born in Geneva on 22 September, 1829. The son of a prosperous notary, he was from his childhood committed to scholarship, and despite having inherited a considerable fortune, devoted his life to exploration and science (Hauser, 1971).

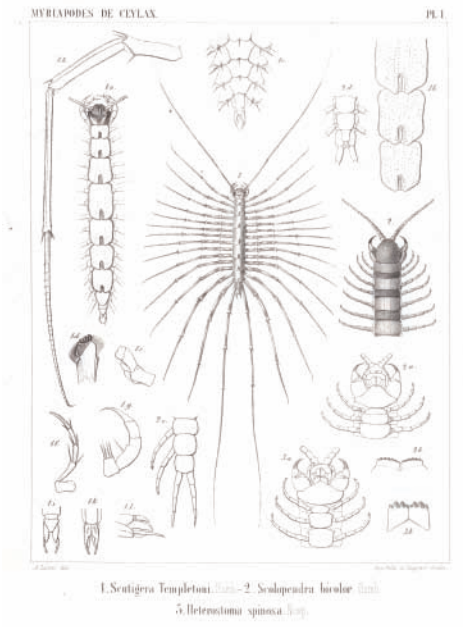
Having studied first at the Geneva Academy and later at Montpellier, where he came under the influence of the French natural historians Guillaume Louis Figuier (1819–1894) and François Gustave Planchon (1833–1900), which whom he formed a life-long association. In 1852, having briefly explored Majorca, Humbert returned to Geneva, where he won a curatorial appointment at the Muséum d'Histoire Naturelle de la Ville de Genève. His initial research was on the reproductive anatomy of scallops, but he quickly began work also on several other marine and freshwater invertebrates. At the Museum he also began a collaboration with the palaeontologist François Jules Pictet (1809–1872), notably their 1856 monograph on fossil chelonians (Fatio, 1887).

Recognizing the young Humbert's enthusiasm and skill, Pictet arranged for him to undertake an expedition to Sri Lanka, mainly with a view to building the Museum's Asian (and later African) collections. This was Humbert's first exposure to the tropics, and he was overcome by the richness of the island's fauna and flora, a stark contrast to that of Europe. The resulting collection of specimens was to keep him occupied for the rest of his life. Although he concentrated largely on describing the diversity of Sri Lankan Myriapoda (millipedes and centipedes), Humbert found time also to work on several other groups of animals, e.g., the description of a new genus and species of pulmonate mollusc he named *Tennentia thwaitesii* in honour of Sri Lanka's colonial secretary James Emerson Tennent (*q.v.*) and the director of the Royal Botanic Gardens at Peradenya, G. H. K. Thwaites (*q.v.*). Based on his collections he also described new species of terrestrial planarians and, while in the island, took a keen interest in its palm flora.

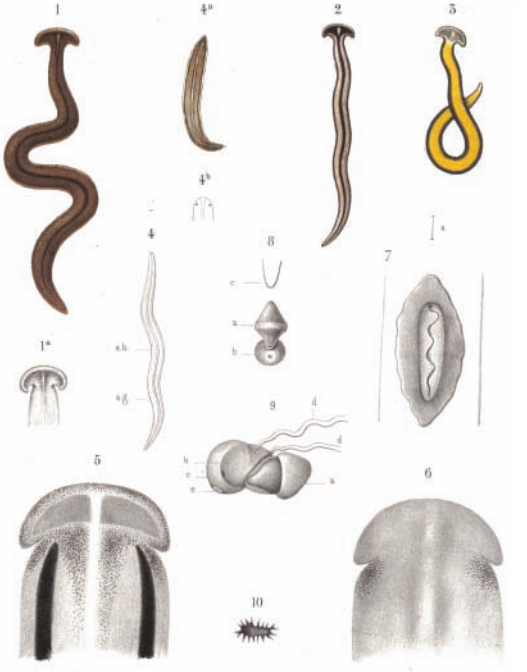
Having been exposed to the Veddah (correctly, Vanniyé Aetto) aborigines for the first time, Humbert also became interested in anthropology and biogeography. For example, he was among the earliest workers to seek to explain the similarities of the insular faunas of the Sunda Islands by positing ancient terrestrial connections, uplift and sea-level fluctuations, all of which then remained to be demonstrated. He was also among the first biologists to conclude from the faunas of the

Aloïs Humbert (1829–1887).

The nest of the Ceylon tailorbird, *Orthotomus sutorius*, delineated by Aloïs Humbert (1866).



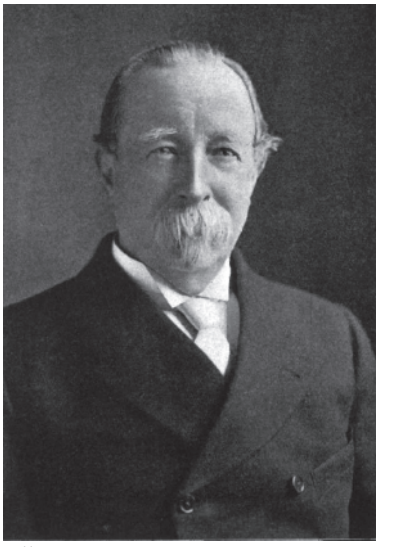
New millipedes from Sri Lanka figured by A. Humbert in his *Myriapodes de Ceylan* (1865), based on collections made by Robert Templeton (*q.v.*) and himself.



Humbert was a pioneer in the study of terrestrial planarians: he discovered and described four new Sri Lankan species (Humbert and Claparede, 1861).

great freshwater lakes Tanganyika and Baikal that they had once been connected to the ocean.

Having returned to Geneva, Humbert worked assiduously not only on his collections, but also on cataloguing the Museum's growing zoological and palaeontological accessions and library. By 1855 he was among the most renowned Swiss scientists, and despite his failing health, kept up a punishing schedule of work and travel, taking in Java, Sumatra, Borneo, Sulawesi and New Guinea. Humbert died on 14 May, 1887, having drawn the admiration of his colleagues for cheerfully continuing to work cheerfully, despite a debilitating illness.



Allan Octavian Hume (1829–1912).

Hume, A. O.

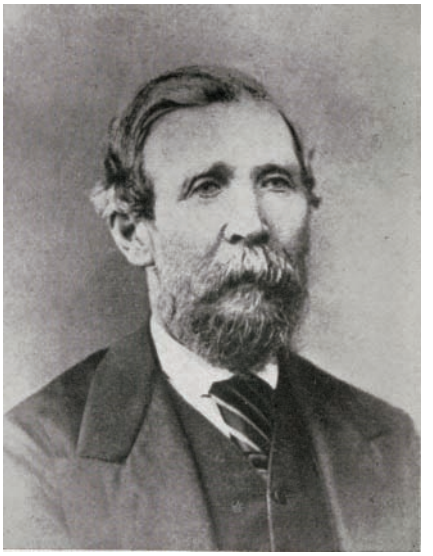
Allan Octavian Hume (6 June, 1829–31 July, 1912) trained as a physician in London prior to joining the Bengal Civil Service in 1849, where he was recognized for his services to education and welfare. As he rose through the service, he was identified increasingly as a radical social reformer on issues ranging from juvenile delinquency to alcohol abuse; he also pioneered the cultivation of firewood to ease pressure on forests. Despite being a servant of the colonial government, Hume (himself the son of an MP) recognized the need for Indian self government and, together with William Wedderburn (1838–1918), inspired the Indian National Congress of 1885 and went on to serve as its secretary until 1908.

From his earliest days in India, Hume travelled throughout the subcontinent collecting birds. Despite his first collection having been destroyed in the 1857 mutiny, he began a new endeavour with renewed vigour and by the end of his life, had accumulated the largest collection of the birds of 'British India' (including Sri Lanka) ever made, housed at Rothney Castle, his palatial home in Simla. With his retirement to England in 1894, Hume's collection—from which almost 100 nominal species had been described—was transferred to the British Museum: 82,000 specimens, including almost 16,000 eggs. By comparison, Hugh Whistler (1889–7 July, 1943), who followed Hume as a zealous collector of Indian birds, accumulated a mere 17,000 skins.

Hume conducted an extensive correspondence with ornithologists in the subcontinent, from many of whom—including E. L. Layard (*q.v.*) and W. V. Legge (*q.v.*) —he received specimens and natural history notes. He wrote extensively, and is best remembered by *The game birds of India, Burmah and Ceylon* (1878–1880), which included 139 chromolithograph plates. Starting in 1873, Hume also edited and published *Stray Feathers*, "a journal of ornithology for India and its dependencies", in which many Sri Lankan collectors and ornithologists of the time published notes. This ceased publication in 1899, by which time, however, 12 volumes, each approximately 500 pages long, had been published.

Jerdon, T. C.

Born in Durham, in northeast England, Thomas Claverhill Jerdon (12 October, 1811–12



T. C. Jerdon (1811–1872).

June, 1872) entered the University of Edinburgh in 1828 to study medicine. He went on to obtain an appointment as assistant-surgeon in the East India Company and later Surgeon Major in the Madras Regiment. Jerdon was an avid natural historian, making extensive collections and writing on topics ranging from plants and ants to birds and mammals while in India.

His *Catalogue of the Birds of the Indian Peninsula,* published in the *Madras Journal of Literature and Science* (1839–1840) described some 420 species, an inventory that more than doubled in his later three-volume *Birds of India* (1862–64). Many peninsular-Indian fishes too, were for the first described by him (1848–49), and his (1867) *Mammals of India* (including many Sri Lankan species), the first popular treatment of this fauna, remained in print for over a century. Jerdon does not appear to have visited Sri Lanka, and did not write specifically on its plants and animals, but his work in India laid the foundation for much exploration and research on the fauna and flora of the island.

Jonville, E.

Eudelin de Jonville, (*fl.* 1798–1805), a Frenchman, is among the most elusive of the early natural historians in Sri Lanka. He appears to have been a protégé of Frederick North (1766–1827), the first British Governor, from 1798 to 1805, of Sri Lanka (Archer, 1962). North commissioned de Jonville to study the cultivation of cinnamon and survey the lands on which such cultivation was taking place. While North recorded that de Jonville carried out his assignment with zeal, by 1800 it became clear that in addition to his regular duties, he had also engaged in "collecting natural curiosities" for the East India Company's museum. "I have actually the description of about 500 species of all classes", he wrote.

In 1800, de Jonville was appointed to accompany Major-General Hay MacDowall as "naturalist, draughtsman, interpreter and receiver of presents" on an expedition to the court of Kandy, which was at the time a sovereign kingdom, suggesting also that he had acquired a working knowledge of Sinhala or Tamil—the court language—in just two years, and went on to assist in the compilation of the first English–Sinhala dictionary (Mills, 1933). On his return, he was appointed Surveyor-General of the island and accepted the challenge to make "a general map of the Island of Ceylon with that exactness which alone can render it useful to Government and at least interesting to individuals fond of the Arts and Sciences" (Brohier, 1950). Jonville was handicapped, however, by the lack of technical equipment necessary for survey and cartography and had perforce to innovate, for example, by making levels by cutting up glass tubes and filling them with water, and scales by engraving on copper (Sivasundaram, 2007).

In 1802, de Jonville sent through North to the Company's museum at Tellicherry (Thalassery, in present-day Kerala), three manuscript volumes entitled *Quelques notions sur l'Isle de Ceylan* (he had also the previous

Rec^d at Tellicherry 3^d Nov. 1801 } Transmitted by the Author

Quelques Notions sur l'Isle de Ceylan

Par Eudelin de Jonville

Chi va lontan della sua patria vede
Cose da quel che gia credea lontane,
che narrandole poi non se li crede,
e stimato bugiardo ne rimane:
ch'il volgo sciocco non li vuol dar fede
se non le vede, e tocca chiare e piane.

Ariosto. –

Colombo fevrier 1801.

Preface

On a rapporté froidement dans des livres qu'il existoit à Ceylan des ruines d'une ville montrant encore des millions de pilliers, et des Pagodes immenses taillés dans le roc. personne n'a été [illegible] encore de verifier ces on dit, ni de faire des recherches sur ce qu'étoit ce peuple qui a fait d'aussi grandes choses. mais on a beaucoup commenté pour savoir si Ceylan n'étoit pas cette isle d'ou l'on tiroit autrefois de l'ivoire, de la Cannelle, de l'or, des pierres précieuses, des Epices de tous les genres qui y sont, et de tous ceux qui n'y sont pas. c'est qu'il y a des hommes qui fixent leurs regards sur des magots de la Chine, et passent devant l'hercule farnèse sans s'arreter.

Nous avons été jusqu'aprésent dans l'ignorance Complette, ou à peupres, sur tout ce qui regarde l'isle de Ceylan. Cependant les portuguais et les hollandois l'ont parcourue dans tous les sens depuis 150 ans. ils ont vu des temples immenses, et ces ruines majestueuses de l'ancienne magnificence des Cingulois. Mais ils n'ont regardé qu'à l'or que renfermoient les temples, et ils les ont renversés pour en chercher encore dans leurs fondements.

Le tems est venu enfin ou sous les auspices d'un Gouverneur ami des arts et des sciences, on s'occupe à déchirer le voile qui enveloppe l'histoire ancienne de l'isle de Ceylan, qui a du être aussi fameuse par ses monuments et par la population qu'ils supposent, que par les richesses qu'elle fournissoit à l'Europe.

J'offre aujourd'huy une partie des premieres notions que j'en ai recueilli. je pourrois les augmenter considerablement si je ne m'étois imposé la loi de ne rien hazarder qui ne puisse être prouvé par les livres ou par les traditions, ou par l'examen immédiat des matieres dont j'ai traité. j'ai des matériaux assés nombreux pour faire un ouvrage cinq ou six fois plus volumineux que celuy ci. mais ils n'ont pas encore le degré d'autenticité que je leur desire. – d'ailleurs il me manque beaucoup de pieces de rapports sans lesquelles je ne pourrois point former d'ensemble. j'espere qu'avec le tems je ~~pourrai~~ satisfairai ~~plus~~ la Curiosité du lecteur plus amplement que je ne le fais aujourd'huy.

je rassemble dans ce moment des notes sur la Grammaire des Cingulois, sur leurs moyens mechaniques dans les arts, sur leur histoire, qui necessite d'abord une liste exacte de leurs Roys: et je poursuis mes recherches sur toutes les productions de l'isle: si une [illegible] heureuse me donnoit une entrée libre dans le Royaume de Kandy, je visiterois le pic d'adam, la fameuse ville d'anou radé-pouré, et la pagode aux milles Boudhous. mais si pendant que je serai à Ceylan les Européens sont toujours confinés dans la partie de l'isle ou ils dominent, qu'il ne leur soit pas permis de voyager autrement qu'avec l'apparat d'une ambassade, je tacherai de suppléer à l'inconvenient de ne pouvoir pas voir par moi même, en recuillant des rapports aussi authentiques qu'il me sera possible.

quand j'aurai fini cet ouvrage, d'autres voyageurs plus éclairés auront plus facilités à en faire un meilleur. peut être en y réflechissant excusera-t-on mes fautes, s'il m'en est échappé. je proteste qu'au moins ai-je eu l'intention de dire la verité. mais . . . .

chi va lontan della sua patria vede
cose . . . .
. . . . . . che non se li crede.

year forwarded a revealing memorandum on the pearl fishery). The volumes (now in the India Office Library in London) contain 184 drawings of Sri Lankan plants, 76 of assorted animals (including 24 birds), and detailed notes on these in the third volume (see pp. 58, 96, 166). Then, this mysterious Frenchman disappeared: there is no further record of him, and it can only be speculated that he died or left the island after North returned to England in 1805.

The de Jonville manuscripts are of great interest because these include several drawings of animals at the time new to science and also represent one of the earliest treatments of invertebrates in Sri Lanka (the drawings include 28 insects, 6 other arthropods, a mollusc and two echinoderms).

He went to great pains not just to describe the natural history and behaviour of many of these animals, but also to portray the language, manners, customs and caste system of the people of Sri Lanka with a sympathy alien to the early period of British colonialism in the island.

His essays include accounts of the geology, religion (Buddhism), astrology and geography, listing some 150 species of plants (together with 157 colour plates and sections of flowers and fruits), 15 mammals, 30 birds, 21 reptiles and several insects (no amphibians).

The *ca* 60 plates of animals include a number of rare and endemic species, and depict interesting behaviours such as the habit of pipe snakes (*Cylindrophis maculatus*) of raising their flattened tails, presumably mimicking a cobra. De Jonville's drawings were used by later natural historians such as Thomas Horsfield (1773–1859) in his catalogues of the insects (1828–29; 1857–59), birds (1854–58) and mammals (1851) in the collection of the East India Company.

Kelaart, E. F.

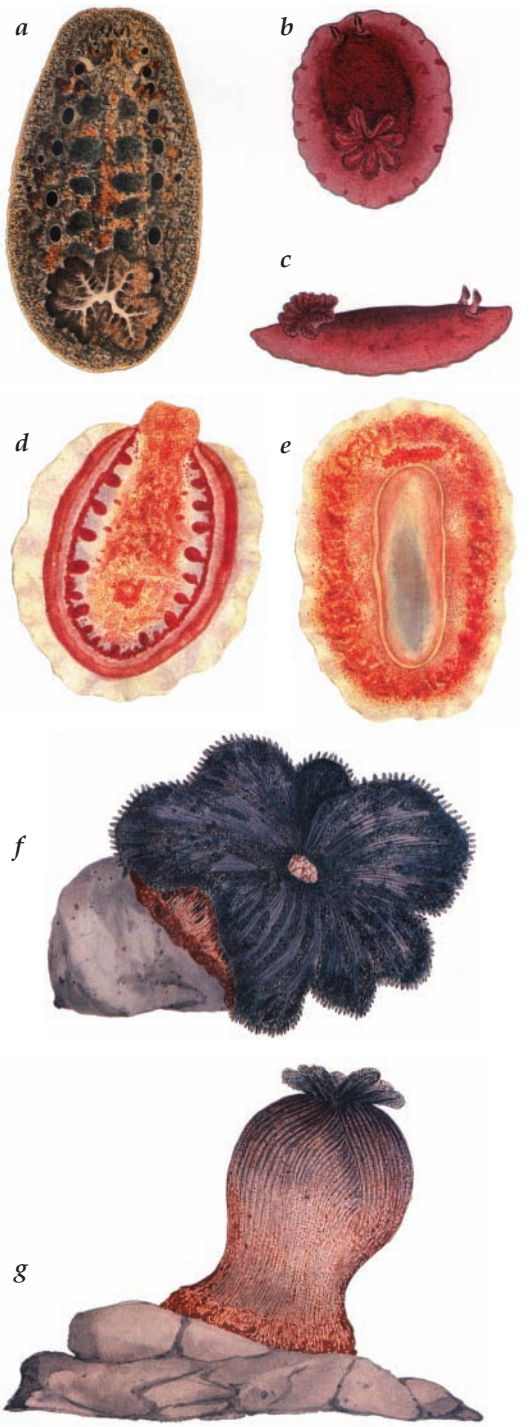
Edward Frederic Kelaart (1819–1860) was born in Colombo, Sri Lanka, on 21 November, 1819 to parents of Dutch descent (the family's roots in Sri Lanka date back to 1726: Pethiyagoda & Manamendra-Arachchi, 1997). Kelaart enrolled as a Medical Sub-assistant in 1835, going on to the University of Edinburgh to study medicine in 1838 (he obtained his membership of the Royal College of Surgeons in 1840, and his MD in 1841).

Opposite -

The manuscript introduction to Eudelin de Jonville's *Quelques notions sur l'Isle de Ceylan* ['Some impressions of the island of Ceylon], dated February, 1801, from which it is apparent that these two volumes were intended to comprise part of a book. It appears that the work was never completed: part of it, however, was published in *Asiatick Researches* (1801). In the introduction, de Jonville expresses awe at the history and archaeology of Sri Lanka, and the astonishing accomplishments of its ancient peoples, including the huge *dagobas* and ancient stone inscriptions. He also refers to natural wealth, such as cinnamon and gems, for which the island had been famous since ancient times.

De Jonville expressed contempt for the Portuguese and the Dutch colonists who, he said, saw these ancient treasures only in terms of the gold and jewels they contained, and not in terms of their 'ancient magnificence'. He was hesitant, however, to give a detailed account of the island's archaeology because he lacked the data to do so reliably, e.g., a chronological list of kings. "I could elaborate on this had I not made it a rule that I would not state anything that cannot be proven by books or by traditions or by immediate examination of the material I found." Otherwise, he said, he could have written a work five or six times as voluminous. He hoped for time to write a more complete work, but it appears that he was denied such an opportunity.

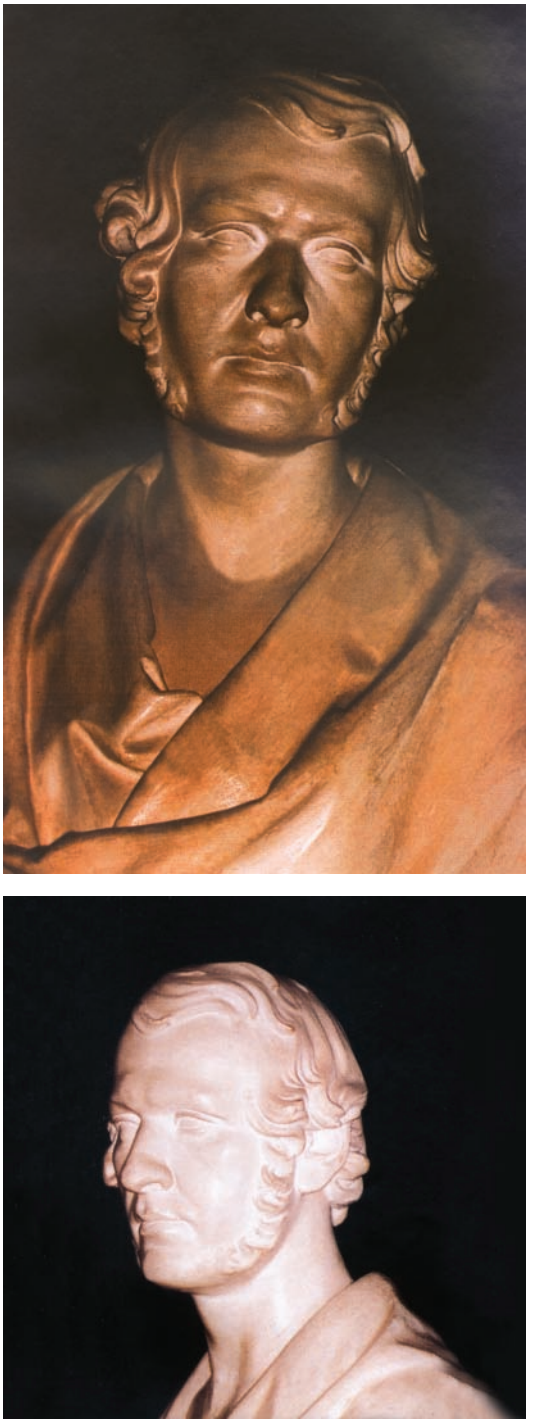
"At this time," he wrote, "I am collecting information on Singhalese grammar, art and history... and continuing my researches on all the productions of the island." But he was handicapped by a lack of access to Sri Lanka's interior, which, at the time [*ca* 1800], was still under the control of the King of Kandy. "If I get an opportunity to enter the Kandyan Kingdom, I will visit Adam's Peak and the famous city of Anuradhapura and the pagoda of the thousand Buddhas... But at this time, Europeans are confined to the areas they control and are not allowed to travel [into the interior] unless accompanied by an ambassador [of the king]."



A–E, Courtesy of The Natural History Museum, London

F–G, Courtesy of the Hancock Museum, Newcastle upon Tyne

Drawings by E. F. Kelaart made at Trincomalee, *ca* 1850. *a, Doris sponegosa; b, c, Doriopsis rubra; d, e, Doris gloriosa; f, g, Diascosoma zeylanica.*

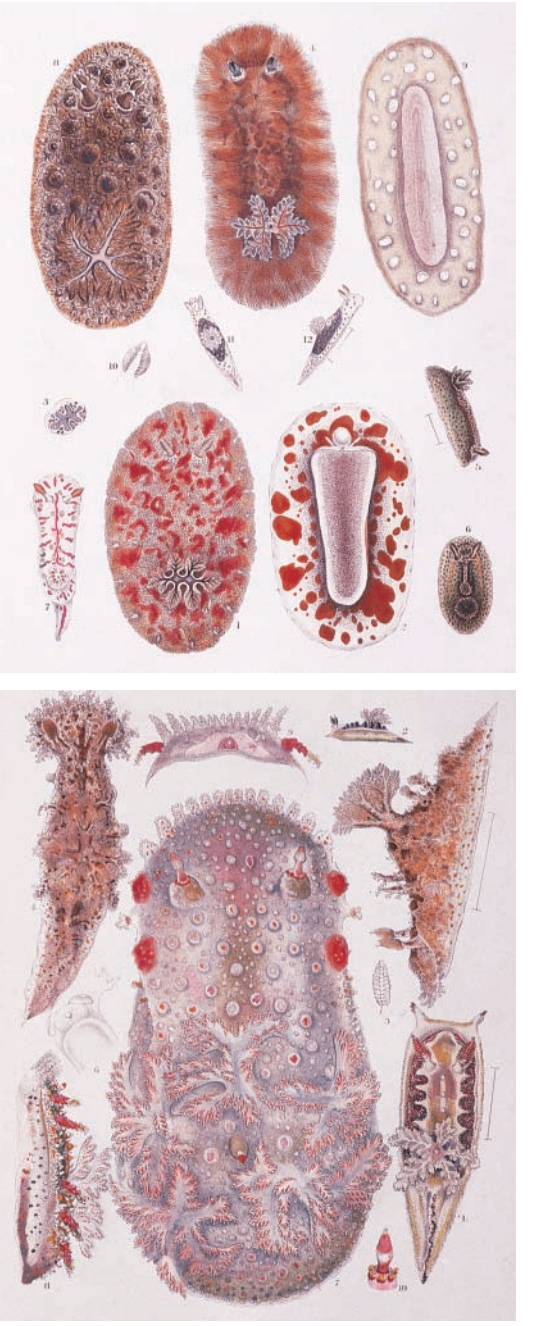


Views of a bust of E. F. Kelaart (1819–1860) in the library of the National Museum, Colombo. The identity of the sculptor is not known.

Though he returned to Sri Lanka later that year as Staff Assistant Surgeon to the British Army Medical Service, he was posted to Gibraltar in 1843 as Army Surgeon. With time on his hands, he indulged in his love of natural history by writing *Flora Calpensis* (1846) (Calpe was one of the pillars of Hercules in Greek mythology), the first flora of Gibraltar. In 1849 he returned to Sri Lanka, where he began for the first time, to make a systematic study of the island's natural history. With work on the exploration of the flora already underway thanks to the efforts of the Botanic Gardens at Peradeniya, Kelaart focused instead on the island's zoological riches. He collected extensively, but with neither a library nor a reference collection at his disposal, was constrained to send much of his material to Edward Blyth (*q.v.*) in Calcutta and John Edward Gray (*q.v.*, 1800–1875), Keeper of Zoology at the British Museum (Natural History), for identification. It was Blyth therefore, who is largely credited in the scientific literature with the publication of the plethora of new taxa discovered by Kelaart in Sri Lanka.

Kelaart spent much time at Nuwara Eliya (Kelaart, 1850b) and explored extensively the montane forests that surrounded it. In 1856 he was appointed Naturalist to the Government of Ceylon by the Governor, Sir Henry Ward (1797–1860) and—predictably—commissioned to study the declining pearl-oyster fishery with a view to its revival. He visited both the traditional site of this industry at Arippo near Mannar, and also Tambalagam Bay south of Trincomalee, which he felt offered better prospects. While at Silavatturai (south of Mannar, on the west coast) in 1859, Kelaart was accompanied by W. A. Humbert, the Swiss zoologist, who published several papers on collections he made there (e.g., Humbert, 1865), on molluscs, planarians and myriapods.

In his report on the oyster fishery (Kelaart, 1857, 1858a), Kelaart predictably dealt rather



E. F. Kelaart's drawings of nudibranchs and planarians he collected at Trincomalee presented future workers on this fauna, including Charles Eliot (1862–1931), Cuthbert Collingwood (1826–1908) and Albany Hancock (1806–1863), opportunities to describe and illustrate species.

more with the natural history of the oyster than its economic potential. While based in Trincomalee, he took time to study the colourful marine invertebrates in the sea around Fort Frederic, delineating from life dozens of species of gastropods, turbellarians and anemones (which he evidently maintained in aquaria). These were to become the basis of later descriptions by himself (Kelaart, 1858b, 1859a,b) and others (e.g. Alder & Hancock, 1866; Collingwood, 1875; Eliot, 1907).

Despite having little time to devote to natural history, being handicapped by a lack of access to the scientific literature and having spent eleven years of his all too short life abroad, Kelaart was remarkably productive, working on mammals (Kelaart, 1850a,c), reptiles (Kelaart, 1854) and birds (Kelaart, 1853) in addition to his favourite nudibranchs, of which he described 63 species as being new to science. Despite this, formal recognition of his talent and industry by the colonial government came too late, and his pleas for the establishment of a natural history museum in Sri Lanka fell on deaf ears: the Colombo Museum was established only 17 years after his death. He was the first native Sri Lankan zoologist of repute, a promising career being cut short by his death, aged just 40, on 31 August 1860, *en route* to England. His *magnum opus* was *Prodromus faunæ Zeylanicæ* (dated 1852 but in fact issued in early 1853), augmented the next year with a supplement (Kelaart, 1854). He was responsible for the description of some 35 new taxa of Mammalia; three new species of birds; four species of Anura; and 12 species of snakes in addition to 16 turbellarians and 22 actiniarians. This contribution supplements, of course, the much larger number of Sri Lankan taxa discovered by him and referred to naturalists overseas, which were reported on independently by them.

COURTESY OF DR. DAYAN KIRTISINGHE

Parakrama Kirtisinghe (1903–1981).

Nannophrys marmorata, the second species in this endemic genus of frogs, in which the tadpoles feed "terrestrially" on algae upon wet rocks, discovered and described by Kirtisinghe in 1946.

Kirtisinghe, P.

Parakrama Kirtisinghe was born on 12 February, 1903 at Hikkaduwa, a coastal town in south-western Sri Lanka, well known for its coral reef (now a sanctuary). Kirtisinghe was a keen swimmer, using his skill to good effect in engaging in his boyhood passion for marine biology. He was educated at Ananda College, Colombo and went on to study medi-

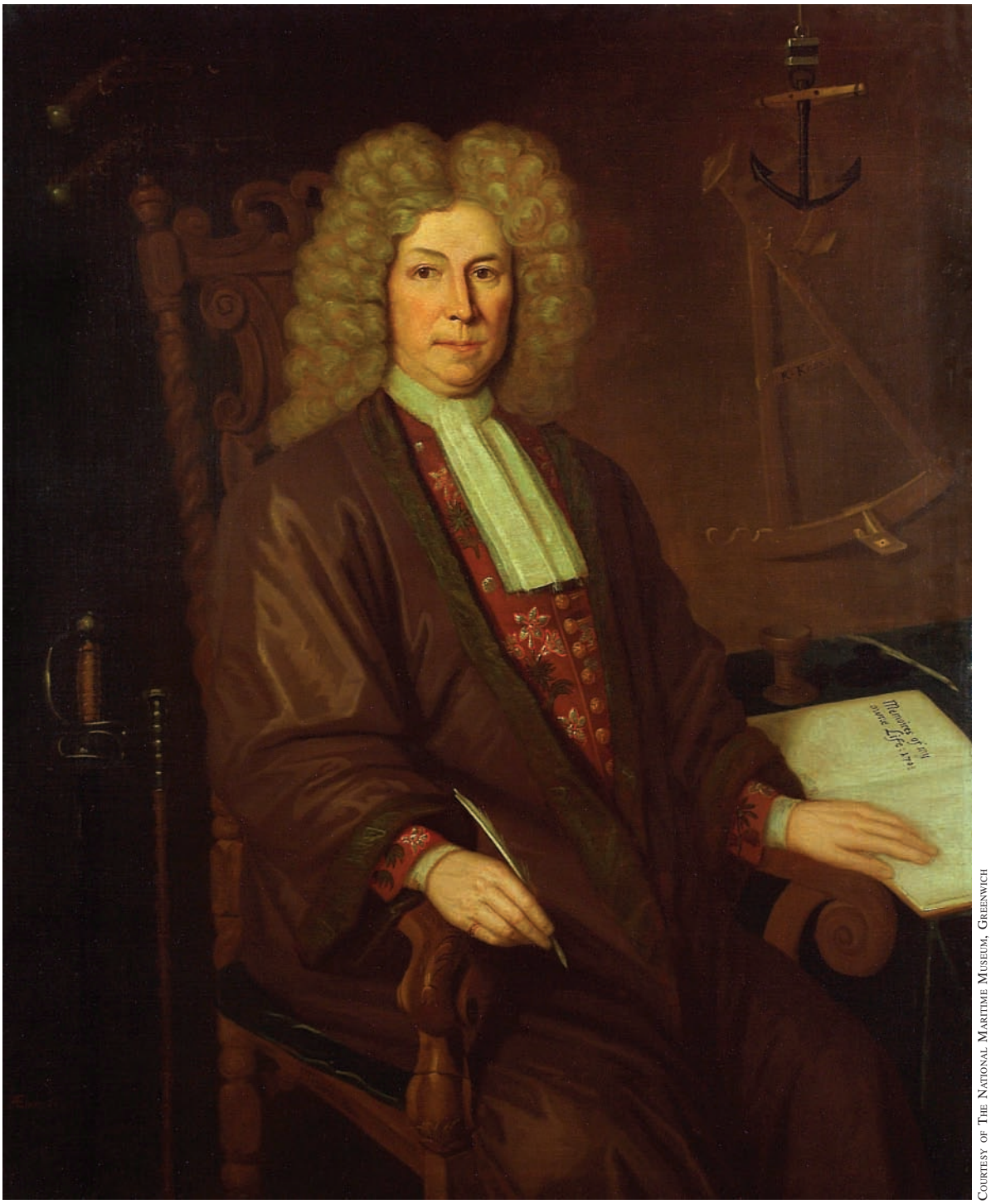
cine at University College, London. He transferred midstream, however, to zoology, his first love, graduating in 1929 and, after World War II, returning to London for a master's degree. He was a teacher throughout his career, rising to be a Reader in Zoology at the University of Ceylon, later becoming Professor and Head of the Department of Zoology at Aquinas University, Colombo. Kirtisinghe travelled and collected extensively in Sri Lanka, especially the groups of special interest to him: amphibians and marine molluscs. His (1955) *Amphibia of Ceylon,* a first treatment of this fauna, helped inspire much work in the years that followed, though his estimate of *ca* 35 species turned out to represent only about a quarter of the island's amphibian diversity (Pethiyagoda & Manamendra-Arachchi, 1998). His (1978) *Sea shells of Sri Lanka* contained relatively little new information, however, and is considered to be of slight importance. Kirtisinghe died in Colombo on 15 June, 1981.

Knox, R.

Robert Knox (8 February 1641–19 June 1720) was the son of an English sea captain (also Robert). *En route* to England from Fort St George, Madras (now Chennai), where Knox Sr had been stationed, their East India Company ship *Ann* anchored in Kodiar Bay, Trincomalee, to take refuge from a storm on 19 November 1659. There, 18 of the ship's crew, including the Knoxes, were taken captive by agents of Rajasinghe II, King of Kandy, of whose domain Trincomalee was then part. The motive for their detention appears to have been simply a desire on the king's part to surround himself with European men, an open menagerie that eventually came to number several hundred interns, many of whom married local women and settled in Sri Lanka. Knox Jr forewent an opportunity to escape when allowed to return briefly to his ship with instructions to flee Trincomalee, and returned to wait on his father ashore. The captives were then taken to Kandy and allowed to settle in various villages. Here Knox Jr made a living initially from "rearing hogs and poultry and knitting caps" (Saparamadu, 1956–58), later achieving a degree of prosperity as a farmer and itinerant tradesman. His father having died of malaria in 1661, Knox Jr was free to roam the country and did so avidly, partly through interest in local life and landscape, and partly to investigate routes of escape. Eventually, in 1679, accompanied by his friend and fellow captive, Stephen Rutland, the 38-year old Knox travelled north to Arippu, where the Dutch had established a settlement to facilitate the pearl trade. Welcomed by the Dutch, he was repatriated to England, penniless, in September 1680.

Knox was quick to begin writing an account of his adventures in Sri Lanka and "perhaps the most valuable account of the life of the Sinhalese people yet written by a foreigner" (Peiris, 1918). Shortly after *An historical relation of the land of Ceylon in the East Indies* was published in 1681, Knox took once more to the sea, as captain of the East India Company's *Tonqueen Merchant,* returning to London to find that his book had made him a celebrity. *An historical relation* came to be a best-seller, reprinted and also translated into German, French and Dutch by the time of Knox's death, on 19 June 1720. Knox himself wrote the book as a private memoir, but was prevailed upon to publish it at the insistence of Robert Hooke, then Secretary of the Royal Society, who contributed the preface. Knox repaid the favour by bringing Hooke the first specimens of marijuana, *Cannabis sativa*, to be seen in Europe, on a subsequent voyage to Asia in 1689. Hooke announced the discovery to the Royal Society the same December.

In addition to being a remarkable adventure story and account of Sri Lanka's 17th-century social and political system, Knox's *An historical relation* contains four chapters on



Courtesy of The National Maritime Museum, Greenwich

Oil on canvass portrait of "Captain Robert Knox of the East India Company, 1642–1720" at the National Maritime Museum, Greenwich, painted in 1711 by P. Trampon. The paper on which Knox's left hand rests reads, "Memoires of my owne life 1708". A sword, cane and a pair of pistols hang on the wall behind him on the left, while on the right is a lodestone attached to a little anchor, and a quadrant.

Engravings from the first (1681) edition of Robert Knox's *An historical relation of Ceylon*. Clockwise from top left: execution by an elephant; fish traps; Sri Lankan primates; and use of a talipot-palm leaf as an umbrella.

the island's fauna and flora, and serves as the first detailed European account of the island's natural history.

In 1694 Knox was dismissed from the service of the East India Company, and took command of a trading vessel, *Mary*, through which he made his fortune. He died a wealthy bachelor.

Knox was not, however, the first castaway to return to Europe from around Sri Lanka. A half-century earlier, François Pyrard de Laval (1570–1621), a French seaman, had that honour. July 2, 1602 Pyrard and a small number of his shipmates were shipwrecked on Baa Atoll of the Maldive Islands, *en route* from Madagascar to the Moluccas (Maluku Islands). Taken captive, they too, like Knox in Sri Lanka, were allowed to roam around the islands but not to leave them. During his time in the Maldives, Pyrard learned Divehi (the Maldivian language) and documented in detail the life and culture of his 'hosts'. His knowledge of Divehi also drew admiration from the court of the king of the atoll nation, where he became translator, assisting in negotiations with the trading vessels that called at Malé and indulging in modest trade himself.

In 1607 Pyrard was able to make his escape when a vessel from Bengal arrived in Malé to retrieve the cannons from his sunken ship, *Corbin*. He was dropped off in Malabar (present-day Kerala), then the trading gateway to India, where he was again detained, this time by the European colonists there. Eventually he was able to make his way back to France, where he arrived in 1611. There, the same year he published his memoirs, which, like Knox's after him, proved to be extremely popular. An enlarged version of his travels, by Pierre Bergeron, appeared in 1615, and another revised edition in 1619. H. C. P. Bell, the pioneer archaeologist in Sri Lanka, who also worked in the Maldives, assisted in the translation and annotation of Pyrard's biography into English, which work was published in three volumes (see Pyrard de Laval, 1887–90).

Kønig, J. G.

Johan Gerhard Kønig (1728–1785, also spelt Koenig and Konig) was a Latvian physician who was in the 1750s also a pupil (and later a disciple) of Linnaeus. After pioneering the botany of Iceland (1765), he was employed as physician to the Danish settlement at Tranquebar (Tharangambadi), on the Carnatic coast of south-eastern India, serving later as naturalist to the court of the Nawab of Arcot, a principality in present-day Vellore District, Tamil Nadu. Kønig married a Goan lady and settled in India. In 1778 he was employed by the East India Company, following which he travelled widely in India collecting mainly plants and butterflies. He made at least three visits to Sri Lanka, in 1777, 1780 and 1781. On the first of these he travelled from Colombo to Kandy (which kingdom, until the beginning of the 19th century, was considered *terra incognita*), making collections throughout. He sent an account of this journey to Etatsråd Müller in Copenhagen, which the latter caused to be published as *Reise fra Tranquebar til Zeylon* (Koenig, 1779a). Fluent in Dutch, Danish, German, Portuguese and apparently also Tamil, he probably returned to India with information of much strategic value to the British, who were keeping a sharp eye on goings on in Sri Lanka, then a Dutch colony.

Much of Kønig's collections of South Asian insects was sent to Johann Christian Fabricius (1745–1808), also a pupil of Linnaeus, who described a number of new species from among them. In these was incorporated Kønig's intimate knowledge of their natural history, as demonstrated, for example, from the name Fabricius gave to the Common Rose, *Papilio aristolochiae*, indicative of its larval food plant, *Aristolochia* spp. He was among the first post-Linnean naturalists to forgo the then fash-

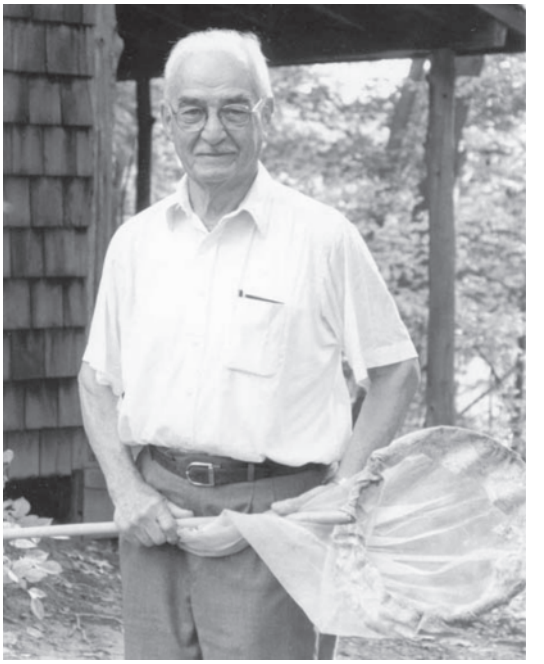
ionable predilection for taxonomy and focus instead on the biology of insects, pioneering work, for example, on the natural history of termites (see Koenig, 1779b).

Kønig was also an avid collector of plants and a pioneer in the scientific validation of the ayurvedic pharmacopoeia, using his position as a physician empirically to test the efficacy of these medicines on unwitting Indians and Europeans, going on to write his doctoral thesis on this subject (Kønig, 1773; H. Goankar, pers. comm.).

Krombein, K.

Born 26 May, 1912, in Buffalo, New York, Karl von Vorse Krombein derived his interest in insects from his father, an amateur lepidopterist. Having gained entrance to Cornell University, Krombein briefly considered a career in medical entomology before deciding to specialize in Hymenoptera (wasps and bees). In 1941 he was hired by the U.S. Department of Agriculture, but with the entrance of the United States into World War II, enlisted and was commissioned as a first lieutenant. Krombein served in New Guinea, Leyte, Luzon and Okinawa, remaining active in the Air Force Reserve after the war, finally retiring, as a full colonel, in 1972. He returned to his job at the Department of Agriculture 1946 and was appointed leader of taxonomic investigations of Hymenoptera, working out of the National Museum of Natural History (Smithsonian Institution), in Washington, D.C., leading a staff of four specialists. Krombein formally joined the Smithsonian's staff in 1965 and went on to become Chairman of its Department of Entomology. He worked indefatigably until 1993, when he retired at 80 years of age. He nevertheless continued research at the museum until August, 2000, and died on 6 September 2005, aged 93.

In 1968, P. H. D. H. de Silva, Director of National Museums, Sri Lanka, on a visit to the Smithsonian, met Krombein and pro-



Karl Kromebein (1912–2005).

Karl Krombein in Sri Lanka *ca* 1988, with Punchi Banda Karunaratne (1930–1996).

Courtesy of Dr Beth Norden

Krombeinictus nordeni, a remarkable pollen-provisioning sphecid wasp discovered by Karl Krombein, living in the internodes of *Humboldtia laurifolia*, a common tree endemic to southwest Sri Lanka.

posed a programme of cooperation between the two institutions. Krombein responded enthusiastically, and a programme focusing on surveying terrestrial and aquatic arthropod diversity was agreed upon in February 1969, with the U.S. Government agreeing to allow Sri Lanka to divert bilateral loan repayments to fund part of the work, and the Smithsonian funding the shortfall. Krombein enlisted an impressive team of American biologists for the proposed studies, assisted in the field by a number of Sri Lankans, and some 125 taxonomic specialists worldwide to work on the collections (Krombein, 1980). Krombein himself published a series of 21 taxonomic revisions and behavioural studies, *Biosystematic Studies of Ceylonese Wasps*, totalling some 800 pages.

The contributions of his colleagues was no less impressive. Don R. Davis sampled insects in some 30 localities in various parts of Sri Lanka, collecting approximately 162,000 specimens, including 17,000 Lepidoptera. From these, for example, Alexej Diakonoff (1907–1989) catalogued 131 species of Microlepidoptera, including 12 new genera and 24 new species putatively endemic to Sri Lanka. Oliver S. Flint, Jr, made an extensive collection of aquatic insects, focusing especially on highland rivers and streams, discovering more than 20 new species of Trichoptera (caddisflies): see Diakonoff, 1982. Paul J. Spangler catalogued 210 species of aquatic beetles, discovering two families and seven genera new to Sri Lanka. Carl Gans worked on caecilians and uropeltid snakes, discovering several new species. Richard W. Baumann, a specialist on Plectoptera (stoneflies), made a collection of some 50,000 aquatic insects including dozens of new species and new records. Ginter Ekis focused his attention on forest leaf-litter insects, primarily Coleoptera (beetles). Michael H. and Barbara Robinson made ethological studies of spiders. Stephen L. Wood surveyed bark beetles, making a collection of some 3,000 specimens while recording also the identities of their host plants. Donald H. Messersmith studied biting midges (Ceratopogonidae), discovering three genera and 10 species not previously recorded from Sri Lanka among these important vectors of disease. Yiau-Min Huang and E. L. Peyton investigated the mosquito fauna, inventorying 64 taxa, including new species. Douglas M. Davies sampled simulid flies (buffalo gnats) in some 175 streams of the wet zone, rearing over 1,500 pupae to adulthood.

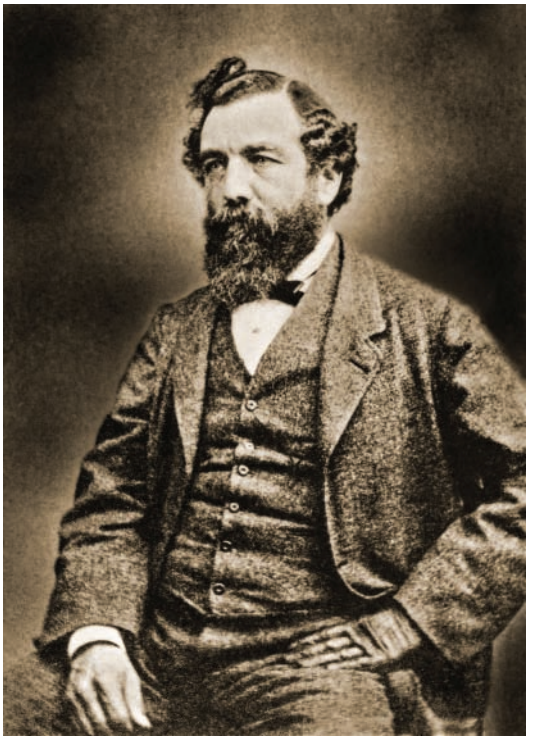
Layard, E. L.

Edgar Leopold Layard was born to British parents in Florence, Italy, on 23 July 1824. He took to natural history studies at an early age, despite active discouragement by his father, who disdained Layard's "low tastes" (Layard: unpublished autobiography in the collection of the McGill University library). He learned taxidermy in his teenage years, during which period he also accumulated a large collection of Lepidoptera. His mother's urgings that he should take to the cloth fell on deaf ears: "I got unorthodox notions about creation, the deity, the sun standing still etc., and I found the church would not do for me", he was later to write.

Just short of his twenty-first birthday, having been a disappointment to his family, Layard decided to emigrate to Canada in the hope of building a career there, and hoping also that Barbara Anne Calthrop, his sweetheart of some three summers (of whom his family disapproved) would follow him there. Learning of this, his mother reluctantly permitted the marriage, and his bride set about acquiring the skills she would need to support a naturalist husband, learning to paint and also develop further her interest in botany. In the mean time, Layard received an offer of employment from a cousin who owned a coffee estate in Sri Lanka. With just £ 17 in hand, the couple departed for Colombo where, shortly after arrival, Layard fell sick. His relatives called upon Dr. Robert Templeton (*q.v.*) to treat him, and the latter, observing the new immigrant's collecting equipment, discovered Layard's interest in natural history and became a lifelong friend. Templeton, Layard later wrote quoting *Proverbs* 18:24, "was the one that sticketh closer than a brother."

An officer in the Artillery, Templeton used his connections to bring Layard to the attention of Colonial Secretary J. Emerson Tennent (*q.v.*), and Layard was, on his recovery, appointed a Custom House Officer at "Balliganbay" (Weligama Bay), an office that carried a salary of £ 100 per annum. Before he could take up this appointment however, Templeton was able to arrange an even better appointment for the naturalist, as private secretary to a judge, at £ 180 per annum with, moreover, the opportunity of residing in Colombo. Layard had by then begun accumulating a natural-history collection of impressive proportions, which he used to found a museum under the auspices of the Ceylon Branch of the Royal Asiatic Society (this was absorbed into the Colombo Museum's natural history collection in 1877).

Shunned by Colombo society for his lowly natural-history pursuits, Layard spent much



E. L. Layard (1824–1900).

of his time collecting butterflies and moths, recording their food plants, and also breeding dozens of species through their larval cycle in his drawing room. He also found time to study for the bar. It was Templeton's departure from Sri Lanka in 1852, however, that formalized Layard's role in natural-history exploration of Sri Lanka. On his leaving the island, Templeton requested Layard to get in touch with Edward Blyth (*q.v.*) at the Calcutta Museum, with a view to providing him with specimens, principally of birds, from Sri Lanka. More importantly for the impoverished Layard (who was now also a father), Blyth offered to pay for his trouble. With money sent by Blyth, Layard purchased a 0.360 shotgun, ideal for collecting birds, and set about his commission with zeal. During his time in Sri Lanka, Layard succeeded in adding no less than 136 species to the island's inventory of 182 bird species at the time he began collect-

Layard's parakeet, *Psittacula calthropae*, the species-epithet of which is in fact an eponym of his wife's maiden name; from *Birds of Asia* (1850–83), by John Gould.

ing. Many of these were to become type specimens under Blyth's hand, and are still preserved (although mostly in poor condition) in the Zoological Survey of India, Kolkata.

Having passed his barrister's examination, Layard sought and obtained an appointment as magistrate at Point Pedro, the northern-most point of Sri Lanka, replacing a judge who had been suspended for accepting a bribe. This job carried a handsome salary of £ 300 per annum, providing him for the first time a taste of affluence. From there, he was to rise swiftly through the ranks of the judicial service, but, after 22 years in Sri Lanka, he finally had to retire to England because of his wife's failing health. While at Point Pedro, Layard had been delighted by the discovery of his first terrestrial planarian which, however, he thought was a leech: "I have seen another curious species [of leech] at Pt. Pedro, which is of a light brown colour above, white underneath; very broad and thin, and has a peculiarly-shaped tail, half-moon shaped, in fact like a grocer's cheese-knife [he confused the head for the tail]; I have seen but two of these, and found them both on the bark of trees, after some heavy rain" (Layard, 1853: 225; see also p. 164). It was Schmarda (*q.v.*), however, who in 1859 formally described the first land planarian from Sri Lanka (Moseley, 1874).

Despite the success he encountered in his natural-history pursuits, he had his share of tragedy, with only one of his seven children (his son Leopold) surviving to majority: the others all died at various stages of childhood. With him to London went nine tons of specimens, to be distributed among specialists and museums. The malacologist William Benson (1803–1870), for example (who had briefly visited and collected in Sri Lanka in 1847), called on Layard and examined his collection of Sri Lankan land snails. On the basis of Layard's specimens, Benson was to describe several new species, taking the island's land-snail inventory at the time to an impressive 117 species (Naggs, 1997).

Once again without employment, Layard took on an assignment to found a museum in the Cape Colony (now South Africa), starting once more at the bottom of the career ladder, as a junior clerk. With the founding of the museum there, however, he was appointed curator, though unable, owing to poor health, to make collections with the same zeal he had shown in Sri Lanka. Nevertheless, his collections formed the foundations of the South African Museum in Cape Town.

Eventually, Layard was appointed private secretary to the Governor, and when the incumbent governor Sir George Grey was transferred to New Zealand, accompanied him there. Here the indefatigable Layard began collecting ferns, which occurred in profusion, his wife tirelessly pressing material repre-

sentative of some 2,000 species (by Layard's own count) into herbarium specimens. His interest in ornithology was still intact, however, as evidenced by his (1887) *The Birds of South Africa*, in which he described 702 species.

After barely a year in New Zealand, Layard was offered an influential position in the Cape thanks to the intervention of Sir Richard Owen, the influential British biologist who in 1884 founded the British Museum (Natural History). He stopped *en route* at Sydney and Adelaide, taking time to collect specimens including two skulls from an aboriginal graveyard, knowing this to be both wrong and fraught with risk. He was later to work in Brazil, Australia, Fiji and new Caledonia. Indeed, it was from Fiji that he (Layard, 1876) wrote a gloating letter to the British Ornithological Union by which most latter-day ornithologists would justly be horrified:

> "Brethren of the B.O.U. (I know you can rejoice with me over the acquisition of a rare bird of beautiful colours and strange appearance), picture to yourselves our delight as we handled the brilliant Orangebird, with the sun-light gleaming through its golden wings, and lighting up the emerald-green of its bill and feet, and of the cere round the yellow-buff eye, now closing, alas! in death."

He saw himself essentially as an amateur and had little time for technical taxonomy and synonymies, in any case being unable to afford the scientific literature of his time. "If I have created a love for *field ornithology* in the rising generation…", he wrote, "I don't care by what names they know their feathered friends."

Layard was also an avid collector of molluscs, especially land snails. At least 20 Sri Lankan molluscs were named *layardi* by malacologists who employed his material, principally William Benson (1803–1870). Many of these specimens were sent to Hugh Cuming (1791–1865) in England: they are now cared for in The Natural History Museum, London (Naggs, 1995). For his part, Cuming sent Layard detailed instructions on collecting snails (Cuming, 1848), a favour Layard repaid by sending Cuming large collections of Sri Lankan molluscs.

Although Layard was well equipped technically to make these descriptions himself, he refrained from doing so on Cuming's advice: he does not appear to have had an ambition to make a scientific name for himself, but seems to have been content with enjoying nature and private natural history study. A large part of the mollusc collection he had with him at the time of his death, on 1 January, 1900, was auctioned and is now at the Manchester Museum.

Layard is most commonly remembered in Sri Lanka by Layard's parakeet, the scientific name (*Psittacula calthropae*) of which is eponymous with his wife's maiden name.

Legge, W. V.

William Vincent Legge (1841–1918), was the only surviving child of Elizabeth LaPenotiere and Robert Vincent Legge, who in 1826 migrated from Ireland, settling in Cullenswood in the Fingal Valley near St Marys, Tasmania, where he farmed sheep and cattle. William Vincent was born at Cullenswood and educated in Bath (England) and later in both France and Germany. He went on to train at the Royal Military Academy, Woolwich, and was commissioned in the Royal Artillery in 1862 and stationed at Dover until early 1867. Later the same year he was posted to Melbourne, Australia, where on 1 December he married Francis Anne Gray (b. 1833, Avoca, Tasmania), daughter of Major William Gray. They were to have three children: Vincent, Robert and Elizabeth.

Legge was posted to Sri Lanka in 1868, by which time he had already begun his career as a serious amateur ornithologist, having two years previously published a letter in *The Ibis.*

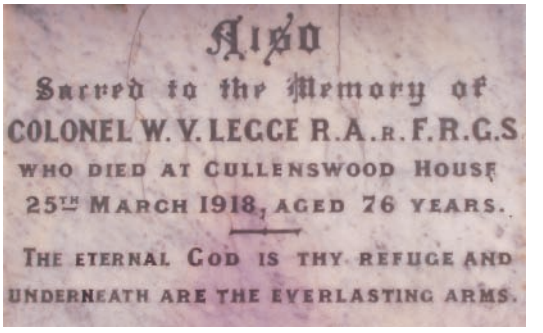
Cullenswood House, Legge's residence in Tasmania, at the time of his residence there.

Cullenswood House *ca* 2004, after renovation.

All images courtesy of Robert Legge

William Vincent Legge (1841–1918), in military uniform.

William Vincent Legge.



Legge's gravestone in the cemetery of Christ Church, built by his father at Cullenswood, Tasmania.

During his eleven years in the island, he occupied his spare time largely with bird watching and collecting specimens, including birds (preserved as skins), nests and some eggs. He maintained a large number of birds in captivity and, as Secretary of the Royal Asiatic Society in Colombo, took charge of and greatly improved its museum. He travelled widely, and took advantage of postings in different parts in the country to observe and collect local birds. In December, 1874, his son Robert William, was born at Trincomalee, where Legge was then stationed.

Legge's intention to publish an illustrated work on Sri Lankan ornithology was made clear from the outset, and he appears to have been aided by the other workers in this field in Sri Lanka. Hugh Neville (b. 19 June, 1848), for example, who had embarked on a collection of Sri Lankan birds with a view to writing a book on the subject, donated the greater part of his collection to Legge, and focused instead on collecting molluscs and indigenous palm-leaf manuscripts (now at the British Museum). Neville had arrived in Sri Lanka aged 17, as a writer in the civil service, and even after his retirement in 1886, continued his researches in archaeology, ethnography and natural history.

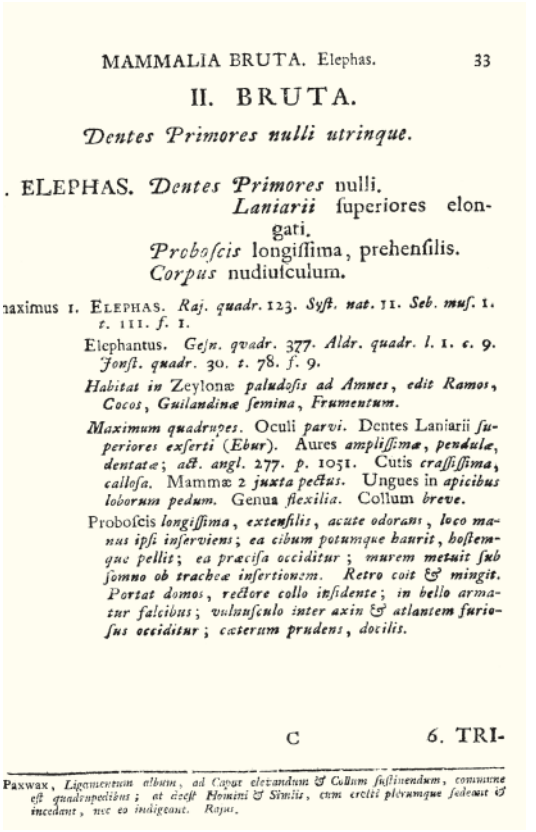
Legge's monumental *History of the birds of Ceylon* (1878–1880) was written largely after he was transferred to England in 1877, where he served as an instructor in gunnery at Portsmouth.

In 1883, Legge was offered command of the Tasmanian military forces. By now a Lieutenant-Colonel, he retired from the British army and served in Tasmania until June 1890, from when he devoted his retirement solely to ornithology. He was again appointed to the same post in 1898, and went on to serve until 1902. In 1901 Legge became a founder of the Royal Australasian Ornithologists Union, serving as its first President until 1903. In 1907, Legge Tor, the highest peak in Tasmania (1,573 m), in the Ben Lomond mountain range, was named for him.

The coloured illustrations of 34 (mostly endemic) species in *History of the birds of Ceylon* were executed mainly by John Gerrard Keulemans (1842–1912), from skins in Legge's collection, based also on his notes on the posture in life of each bird. Legge's work was meticulous, involving comparison of the 371 species he recognized from Sri Lanka with Indian specimens in the collection of The Natural History Museum in London. He lived at Cullenswood House, St. Mary's until his death on 25 March 1918. In 1902 he had presented the major part of his collection to the Hobart Museum which, in 1936, in accordance with his wishes, presented his Sri Lankan bird specimens (678 skins representing 278 species) to the Colombo Museum (Wijesinghe, 1997; Stevenson, 1962). A part of his collection had previously been gifted to the British Museum (Natural History), in London. Legge was buried in the graveyard of Cullenswood Church, built by his father *ca* 1846.

Lewis, G. W.

Born in Blackheath, England, George W. Lewis (5 August 1839–5 September 1926) became fascinated by beetles as a boy and continued this interest when he was posted to China at the age of 23 as the representative of a firm engaged in the tea trade. Lewis collected in Japan *ca* 1864 and 1867, remaining there and amassing a considerable collection, until 1872, when he returned to England. In 1880 he travelled to Japan for a further two years and on his return, stopped in Sri Lanka for six months and made a large collection of beetles. Lewis's Sri Lankan collections were described by himself and by several other coleopterists, including H. W. Bates (1825–1892) (see Bates, 1886). His collections are mainly at The Natural History Museum, London, and the Mason collection at Bolton.



MAMMALIA BRUTA. Elephas. 33

II. BRUTA.

Dentes Primores nulli utrinque.

. ELEPHAS. *Dentes Primores* nulli.
Laniarii ſuperiores elongati.
Proboſcis longiſſima, prehenſilis.
Corpus nudiuſculum.

naximus 1. ELEPHAS. *Raj. quadr.* 123. *Syſt. nat.* 11. *Seb. muſ.* 1. *t.* 111. *f.* 1.

Elephantus. *Geſn. quadr.* 377. *Aldr. quadr. l.* 1. *c.* 9. *Jonſt. quadr.* 30. *t.* 78. *f.* 9.

Habitat in Zeylonæ *paludoſis ad Amnes, edit Ramos, Cocos, Guilandinæ ſemina, Frumentum.*

Maximum quadrupes. Oculi *parvi.* Dentes Laniarii *ſuperiores exſerti* (*Ebur*). Aures *ampliſſimæ, pendulæ, dentatæ; act. angl.* 277. *p.* 1051. Cutis *craſſiſſima, calloſa.* Mammæ 2 *juxta pectus.* Ungues in *apicibus loborum pedum.* Genua *flexilia.* Collum *breve.*

Proboſcis *longiſſima, extenſilis, acute odorans, loco manus ipſi inſerviens; ea cibum potumque haurit, hoſtemque pellit; ea præciſa occiditur; murem metuit ſub ſomno ob tracheæ inſertionem. Retro coit & mingit. Portat domos, rectore collo inſidente; in bello armatur falcibus; vulnuſculo inter axin & atlantem furioſus occiditur; cæterum prudens, docilis.*

C 6. TRI-

Paxwax, *Ligamentum album, ad Caput elevandum & Collum ſuſtinendum, commune eſt quadrupedibus; at deeſt Homini & Simiis, cum erecti plerumque ſedeant & incedant, nec eo indigeant. Rajus.*

The description of *Elephas maximus* in Linnaeus's (1758) *Systema Naturae*, from where the species got its name. Linnaeus's simple, telegraphic Latin set the style for taxonomic description for centuries to come.

Linnaeus, C.

Linnaeus described a large number of Sri Lankan species in the various editions of his *Systema Naturae*, based on the earlier literature and on specimens that came into his possession (the provenance of most of which is not clear). It appears that for the most part these specimens belonged to 'cabinets' taken to Europe by visitors to Sri Lanka who indulged only incidentally in natural-history collecting. (See pp. 49–53 for an account of his contribution to Sri Lankan botany.)

Loten, J. G.

Born in Maartebsdijk in the Netherlands, Joan Gideon Loten (15 May, 1710–25 February, 1789) was appointed an "under merchant" of the Dutch East India Company in 1732. He was for the entirety of his career an officer of the Company. In 1733 Loten married Anna Henrietta Beaumont, shortly after which he was posted initially to Jakarta, and then to Sulawesi (Celebes). In 1752 he was made governor of the Dutch possessions in Sri Lanka, an appointment he was to hold until 1757 (his wife died during his tenure, in 1755). Loten had an abiding interest in science, including natural history, meteorology, archaeology and cartography.

During his time in Sri Lanka, Loten made an extensive collection of animal specimens, maintaining a sizeable menagerie in the Governor's Castle in Colombo. Although his specimen collection extended to all branches of zoology, including molluscs, spiders, scorpions, crabs, fish, reptiles and mammals, it is clear that his primary interest was in birds, many species of which he maintained alive as pets (including a parakeet given to reciting Latin poetry taught by its master). While he commissioned Pieter Cornelis De Bevere (1722– *ca* 1780, *q.v.*), a competent artist, to illustrate these specimens, it is evident from Loten's manuscripts that he himself executed some of the drawings.

Following his term as governor, in 1758 Loten retired to Fulham, near London, where he was to spend much of the rest of his life, with occasional visits to the Netherlands. In 1765 he married Laetitia Cotes of Cotes in County Stafford. In England, Loten engaged in a protracted dispute with regard to money due to him from the East India Company, while at the same time immersing himself in natural-history studies, in recognition of which, he was elected a Fellow of the Royal Society in 1760. Loten died in Utrecht, Holland, 1789.

Despite his being a foreign national, he was so respected by British society that a memorial to him sculpted by Thomas Banks (1735–1805) was erected in the North Aisle of the nave of Westminster Abbey in 1793. His epitaph reads, "[B]y these principles he lived: genuine faith, surpassing calmness of spirit, temperate pleasing manners, and deep but wide learning." The location of his grave, presumed to be in Utrecht, is not known.

The Committee Minutes of the Trustees of the British Museum (2: 575) record, on 26 October 1759: "Mr. Loten... presented several birds and other productions of the East Indies … and such original drawings of birds and other animals out of his own collection, as are not already in the Museum." Thus the Loten-De Bevere drawings came into the possession of The Natural History Museum, London, a few of De Bevere's topographical drawings being retained in the Rijksprentenkabinet of the Netherlands (van Diessen & van den Belt, 1987).

Born in Sri Lanka in 1722, de Bevere (also spelt Beveren) entered the VOC's service as a surveyor in 1743, becoming a qualified surveyor in 1754 (van Diessen & van den Belt, 1987; Wardle, 1987; Rice, 1999). He was the grandson of Willem Hendrik de Beveren, a captain in the Dutch East India Company, who in 1706 became commander of one of the brigades sent to quell the Soerapati revolt. Shortly thereafter he was court-martialled for insubordination, acquitted and sent to Sri Lanka, where he lived for many years. On Loten's retirement in 1757, Pieter De Bevere accompanied the Governor on a tour of the Dutch possessions in the East Indies (now Indonesia), where he rose to the rank of Bookkeeper. From there all traces of him vanish, it being inferred that he died before 1781. While de Bevere is remembered largely for the value his biological illustrations were to have in future taxonomic work relating to Sri Lanka, he was one of several artists (mainly surveyors and cartographers) Loten commissioned, who include also the East-Prussian, Carl Friedrich Reimer and the Dane Johannes Rach (1720–1783).

By permission of the Dean and Chapter of Westminster

The only known likeness of Joan Gideon Loten (1710–1789), a medallion in the hand of Generosity, in the memorial at Westminster Abbey, London (see also caption on next page).

The Loten-De Bevere drawings, one of the earliest collections of faunal illustrations from Sri Lanka, were used extensively by other naturalists as the basis for the description of the various species, and many of them were to become 'iconotypes', with the specimens upon which they were based having mostly been lost since. They are to Sri Lankan zoology what the Hermann herbarium was to its botany.

Loten's drawings were reproduced in George Edwards' (1694–1773) *Gleanings of Natural History* (1758–64) and Peter Brown's (*fl.* 1738–1799) *New illustrations of zoology*

By permission of the Dean and Chapter of Westminster

The Loten memorial by Thomas Banks (1735–1805), erected by a window in the north aisle of the nave of Westminster Abbey in 1793. Banks himself is commemorated in a memorial a few metres to the left.

The memorial shows a figure of Generosity, attended by a lion, placing a medallion portrait of Loten on a column. The first part of the inscription is in Latin and can be translated: "Sacred to the memory of the most famous and excellent man, John Gideon Loten, Governor of Batavia in the East Indies, sometime Minister both in the Island of Celebes and Ceylon, distinguished by the highest office. Fellow of the Royal Society of London and of the Society of Antiquaries. In serving his country through public works he was a distinguished citizen of the highest rank. In his private affairs all things were carried out with the utmost care and diligence and by these principles he lived: genuine faith, surpassing calmness of spirit, temperate pleasing manners, and deep but wide learning. He went to India in 1732; and married on 24 August 1733 Anna Henrietta Beaumont, who died on the 10 August 1755. He came back to Europe in the year 1758 and married in England secondly on the 4 July 1765 Laetitia Cotes of Cotes in the county of Stafford. He died in Utrecht on the Rhine on 25 February 1789, aged 80." Below that, in English, is an extract from Psalm 15. The painted coats of arms on the west (or left) side of the memorial represent the families of Schade van Westrom, Hoeuft, Aerssen van Júchen and Deutz. Those on the east side are for Selyns, Strick van Linschoten, Deuverden and Loten himself (a gold shield with a bulb or root on it from which shoot two sprigs of a flower).

(1776). Neither Edwards nor Brown used Latin binomials; these were supplied later by Carl Linnaeus in the 12th edition of his *Systema Naturae* (1766), and Johann Friedrich Gmelin (1748–1804), who edited the 13th (1788–89) edition (Wijesinghe, 1997). Thomas Pennant (1726–1798) commissioned the British botanical artist Sydney Parkinson (*ca* 1745–1771), artist of Cook's *Endeavour* voyage, to copy Loten's Ceylon drawings in The Natural History Museum's collection (Wheeler, 1983), for reproduction in Pennant's *Synopsis of Quadrupeds* (1777), *History of Quadrupeds* (1781) and *Indian Zoology* (1781). Many Sri Lankan animals—especially birds—derive their names thus, from Pennant's works, and Loten's drawings could be considered the foundation upon which Sri Lankan ornithology has been built (van Houten, 1907; van Diessen & van den Belt, 1987; Wardle, 1987).

First page of a letter dated 21 March 1781 addressed by Joan Gideon Loten to Jan Deutz in Amsterdam, now in the Loten manuscripts accompanying the drawings in The Natural History Museum, London, is typical of the style of the notes Loten maintained on the drawings and specimens in his collection (text translated into English by Dr. Lipke B. Holthuis, Nationaal Natuurhistorisch Museum, Leiden).

> Dear Sir, Mr. John Berens has allowed me to send to his house, to be forwarded to your honour, a tin roll wrapped in black oil cloth, around which string, and sealed as such; with a label carrying your honour's name, etc. I had the intention to have the said roll or tin box be handed to you on 16 February. Because of indisposition and haste I forgot to add to the contents a list of the objects contained in it; see the following. Herewith I comply with the most respectful willingness to

Courtesy of The Natural History Museum, London

Purple-faced leaf monkey, a primate endemic to Sri Lanka, figured in the Loten-de Bevere collection.

A selection of Pennant's bird iconotypes based on Loten's drawings: clockwise from top left, Sri Lanka collared scops owl, *Otus bakkamoena;* Painted stork, *Mycteria leucocephala;* Ceylon tailorbird, *Orthotomus sutorius;* and Pied harrier, *Circus melanoleucos.*

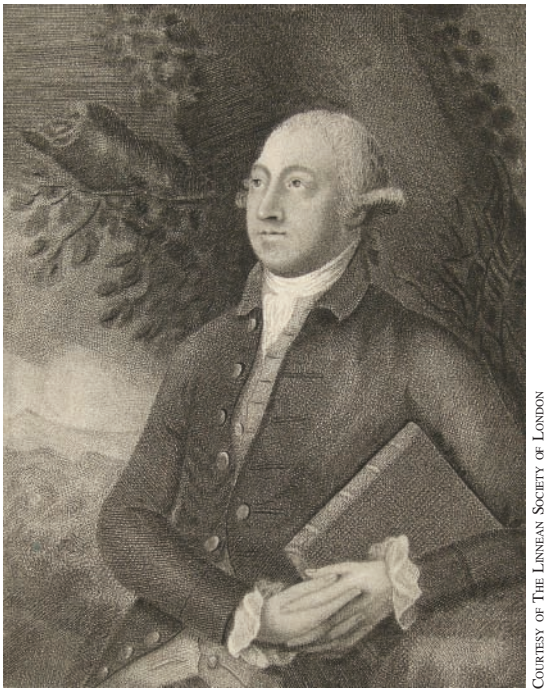
Many Sri Lankan birds and mammals were described for the first time in Thomas Pennant's *Synopsis of Quadrupeds* (1777), *History of Quadrupeds* (1781) and *Indian Zoology* (1781). Pennant's descriptions, based on Loten's Sri Lanka drawings, are the oldest, and therefore provide the valid scientific names for these species. Above, the Redfaced malkoha, *Phaenicophaeus pyrrhocephalus*, evidently drawn by an artist who had never seen the bird in life; and below, a more honest illustration of a freshly-killed Trogon, *Harpactes fasciatus*.

Courtesy of The Natural History Museum, London

Pennant's descriptions were based largely on J. G. Loten's collection of drawings in London's Natural History Museum. The drawings were copied by Sydney Parkinson, and only an outline printed in the actual book. These were then individually hand-coloured, an expensive process that resulted in only small numbers of books being printed. There was also some loss of quality as a result of repeated copying by hand, as Loten's original drawing of the Giant squirrel, *Ratufa macroura,* above, shows when compared to the reproduction in Pennant's *Indian Zoology* (below), in which a landscape was incorporated, evidently to add verisimilitude.

Indian paradise flycatcher, *Terpsiphone paradisi*, in the collection of Loten drawings at The Natural History Museum, London.

George Edwards (1694–1773).



Thomas Pennant (1726–1798).

your request of 31 October.

No. 1. The bird of paradise, alive and thriving, as very carefully drawn with its colours in 1757 by Mr. de Bevere (a young man from native Ceylonese parents, who stayed with me and helped me considerably in making drawings). It had an osier cage (like those of magpies); in it it had rubbed off a great part of the two long tail feathers, which, however, were kept separately.

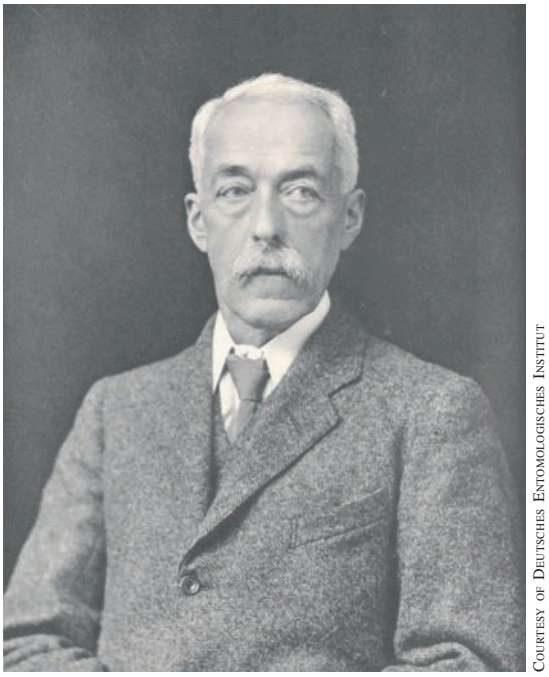
No less beautiful and of the same size is the drawing shown as No. 2, which Mr. Banks, P.R.S. had made by an able artist of his most complete specimen. He allowed me all the time to make a composite drawing of these two at my home. I have forgotten to number the two drawings 1 and 2, but it will be easy for you to recognize them and number them. I beg of you or of Mr. van der Aa to do so so that there will not be any confusion. I hope in the future (should heaven give me a sufficient degree of health) to work with these. I saw the bird eat the fruit of the banana and cold cooked rice. I do not know whether any specimen of this species has ever been observed at one of our eastern establishments, but it is said that they are native to New Guinea and the islands S.E. and S.W. of Banda. But before I saw one alive with Mr. General Mossel I had not met anyone who had seen anything but dead dried skins.

3. A very large (I only compare it here to the middle species) wood pigeon caught near Colombo and kept alive by me for a very long time. It measured 16 inches and weighed 5 $^{3/16}$ ounce (Dutch weight). In the drawing, its size is, measured from the tip of the bill to …

Mackwood, F. M.

Born in Paignton, Devon, England, Frank Mitchell Mackwood (12 July, 1843–9 June, 1931) joined his father, a coffee planter turned businessman, in Sri Lanka 1861 (d'Abrera, 1998). Mackwood Sr. and his brother, William, managed their family's eponymous and highly successful company, Mackwoods

(Villiers, 1940). Having begun his career in Sri Lanka as a planter at Kadugannawa, Frank Mitchell Mackwood rose quickly in the family business, taking his seat in the Legislative Council in 1880, a distinction matched by becoming head of his father's highly successful company, Mackwoods, in 1883 (Mackwood's business focused on servicing Sri Lanka's rapidly growing coffee and tea industries). Mackwood was elected Chairman of the Ceylon Chamber of Commerce for seven years in the period 1888–1900, and continued to head his company until 1916, when he retired. Mackwood was an avid butterfly collector and in addition to establishing a large collection at the Colombo Museum, also sent cabinets of specimens to lepidopterists in England and India. Although he wrote little, he was generous in using his vast knowledge of Sri Lankan butterflies to aid the work of others, using also his formidable influence to support and encourage local entomologists such as Walter Ormiston (*q.v.*).



Courtesy of Deutsches Entomologisches Institut

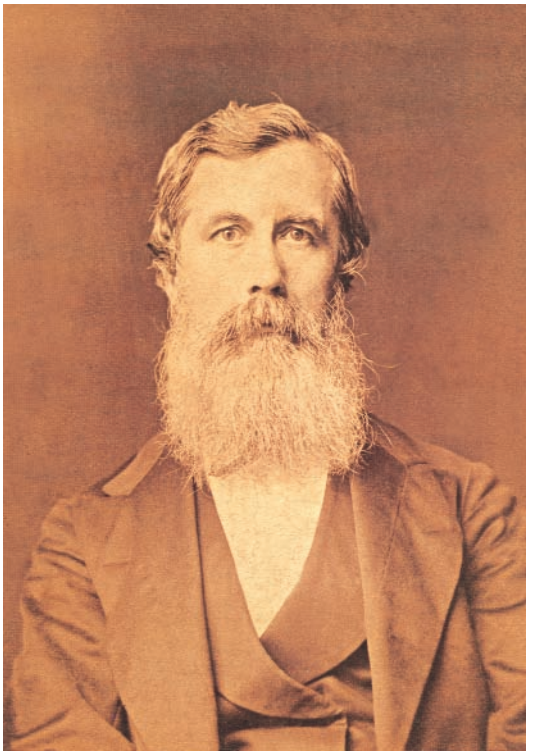
Edward Meyrick (1854–1938).

Madarász, G.

Gyula Madarász (1858–1931), was Curator of Birds at the Royal Hungarian Museum, Budapest. He visited Sri Lanka in 1896 and made and reported on an extensive collection of birds which, however, was destroyed during the Soviet Union's brutal suppression of the Hungarian uprising of 1956 (much of the museum's other collections had also been destroyed in World War II).

Meyrick, E.

Born in Ramsbury, England, Edward Meyrick (25 November, 1854–30 March, 1938) was educated at Marlborough College and then at Cambridge, obtaining a first class in the Classical Tripos in 1877 (his first scientific publication, *List of Local Lepidoptera*, dates from 1873, the year he joined Cambridge). From end 1877 to 1886, Meyrick travelled through Australia and New Zealand, teaching for some time in Sydney and Christchurch, during which time he developed his studies of Microlepidoptera. In 1886 he returned to teach classics at Marlborough, devoting all his spare time to the systematics of Microlepidoptera. His studies extended far afield, including South Africa and India, on the moths of which he wrote a series of papers in *Journal of the Bombay Natural History Society* between 1905 and 1914. These, and his *Exotic Microlepidoptera* series, contain descriptions of hundreds of new Sri Lankan moths: "To this great lepidopterist we chiefly owe our knowledge of all groups of Microlepidoptera of Sri Lanka. After his death this information stopped abruptly" (Diakonoff, 1982). While Meyrick concentrated largely on the Microlepidoptera, the larger moths continued to be studied by other workers until the early part of the 20th century. Willey (1903) catalogued 5,248 species of moths in the collection of the Colombo Museum, based on identifications made by



Frederic Moore (1830–1907).

George Francis Hampson (1860–1936) for the five volumes on moths in *Fauna of British India* (1892–1937).

It is estimated (Hill, 1939) that in his 60-year career as a lepidopterist, Meyrick described some 20,000 new species, in addition to hundreds of new genera and several new families. His collection, donated to London's Natural History Museum, contains in excess of 100,000 specimens, minutely indexed, including watercolour drawings of hundreds of species. In 1904 he received what was perhaps a unique honour for a schoolmaster: fellowship of the Royal Society.

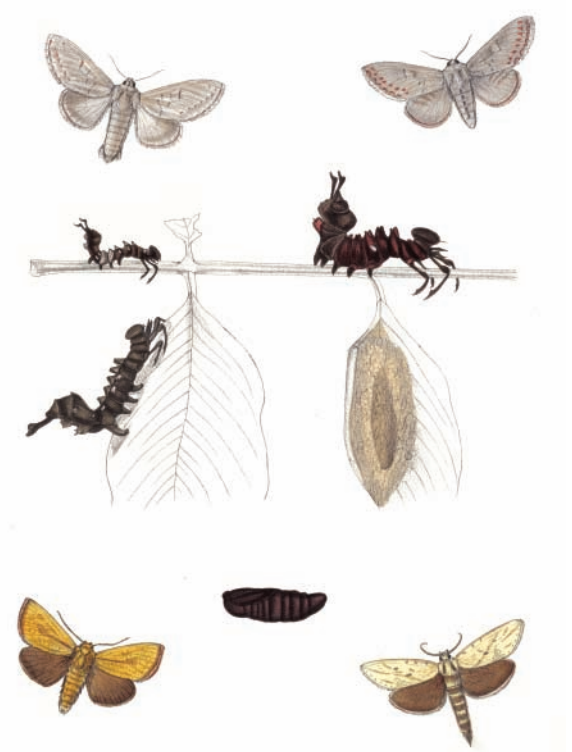
Moore, F.

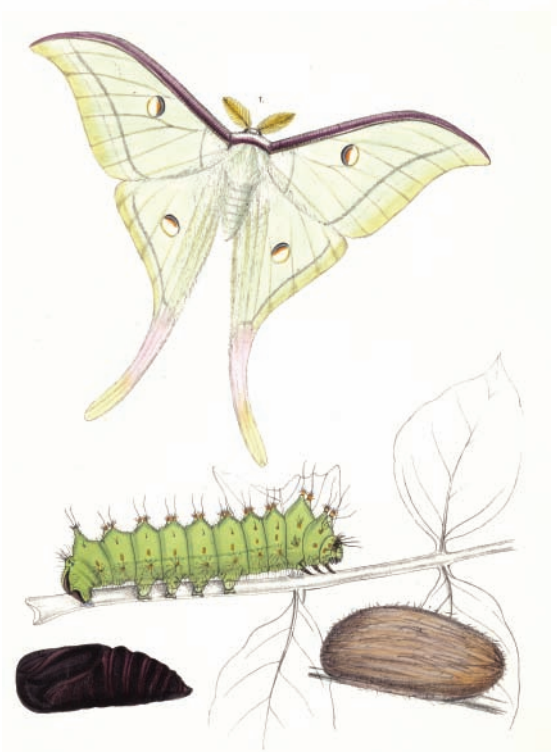
Frederic Moore (13 May, 1830–10 May,1907) was hired by Thomas Horsfield (1777–1859) as an zoological artist to the museum of the East India Company in London, where he continued to serve up to the time it was disbanded, in 1879, by which time he had risen to the rank of Assistant Curator. Here he became acquainted with the extensive collections of Indian Lepidoptera, and went on to produce his 12-volume *Lepidoptera indica* (1890–1913), completed after his death by Charles Swinhoe (1836–1923); and, with Thomas Horsfield (1773–1859), *A catalogue of the birds in the museum of the East-India Company* (1854–58). In 1879, Moore retired from the service of the East India Company and transferred to the Hope Museum, in Oxford.

In 1874, G. H. K. Thwaites (*q.v.*), director of the Royal Botanic Gardens, Peradeniya, persuaded the governor, William Gregory (*q.v.*), to finance a special project for William de Alwis, a Sri Lankan botanical artist attached to the Gardens, to 'paint the butterflies of Ceylon'. Gregory, an enthusiastic amateur naturalist, was persuaded to support the venture with his personal funds, and the project commenced. In addition to collections made by Thwaites and de Alwis, specimens collected by Robert Templeton and Edgar Layard, too, were used for the illustrations (they had, among them, collected more than 900 species of butterflies and moths from Sri Lanka). Some 350 species were figured by de Alwis, an astonishing ~250 of them complete with larva, pupa, imago in both sexes, and larval food plant.

Opposite -

In drawing the Sri Lankan butterflies and moths later to be used by Frederic Moore in his *Lepidoptera of Ceylon*, William de Alwis was careful to depict, wherever possible, also the larva and chrysalis of each species, together with the food plant. Being uncertain of the variation within each species, he also drew as many variants as he could, which helped Moore greatly in his taxonomic endeavours. Almost all the figures were drawn life-size, here reduced to about 20% of the original dimensions. The figured specimens were preserved at the Peradeniya Herbarium by G. H. K. Thwaites.





A plate from Frederic Moore's (1880–87) *Lepidoptera of Ceylon*, redrawn from William de Alwis's original (at bottom of opposite page). In instances when he was dissatisfied with de Alwis's drawings or desired more clarity (here partly to conceal the insect's forelegs), Moore, a gifted artist in his own right, redrew the plates.

So exceptional were the drawings that Thwaites was loath to consign them to London by sea. By way of insurance, he prevailed upon Gregory to commission William's brother George de Alwis, also a botanical artist at Peradeniya, to make a complete and accurate set of copies. These were then sent to England and exhibited at a meeting of the Entomological Society of London in 1878, where it was resolved that a case be made to prevail on the government of Ceylon to publish the work. As luck would have it, William's priceless originals, retained in Sri Lanka, were lost.

Conditional to publication costs being met, Moore offered to write the accompanying text free of charge while Sri Lanka's governor, James Longdon (1827–1891), was persuaded by his predecessor, William Gregory (*q.v.*), to fund the cost of publication, a (then) staggering £1,500. The work was eventually published in three volumes totalling 964 pages

L. A. Nicholls (1885–1969).

and 215 hand coloured, lithographed plates. Thanks to government patronage, copies of Moore's *Lepidoptera of Ceylon* were made available for consultation by lepidopterists at many government *katcheris* (district administrative offices) (Ormiston, 1917), though these have now altogether disappeared. George de Alwis's copies, upon which Moore's plates were based, are in the Entomology Library of the Natural History Museum, London.

Nicholls, L.

Lucius A. Nicholls was born in Tendring, Essex, on 22 January, 1885. The son of a physician, he studied medicine at Downing College, Cambridge, and the London Hospital Medical College, obtaining his registration in 1906 and going on to serve at St. Lucia in the British West Indies from 1908–13 and Kadjiado, Kenya in 1914–15. The following year Nicholls was appointed lecturer in bac-

teriology at the Ceylon Medical College, later becoming director of the Bacteriology Institute (now the Medical Research Institute). He was particularly interested in nutrition, to which field he made seminal contributions (Wikramanayake, 2000), not least his demonstration that affluent children were more likely to be above average height than those from poorer backgrounds. This work led directly to the government providing a midday meal to all vernacular-school children in 1937.

Nicholls' (1938) *Tropical Nutrition and Dietetics* became a bestseller, running into four editions and remaining in print until the late 1960s. In 1945, having been awarded the CMG for his service during World War II, Nicholls returned to England and joined the World Health Organization, where he worked until his retirement (to Cork, Ireland) in 1949. He died in Brighton, Sussex, on 3 September, 1969.

During his years in Sri Lanka, Nicholls took a keen interest in the island's reptiles, especially the snakes, publishing five papers on this fauna (including the description of a new fossorial species, *Uropeltis phillipsi* and an identification guide in 1929).

Nicéville, C. L. A. de.

Born in Bristol, England, Charles Lionel Augustus de Nicéville (1852–13 December, 1901) arrived in India in 1870 to take up employment as clerk in the service of the colonial government. He was a passionate amateur lepidopterist, however, and from the early 1880s devoted himself almost entirely to the study of Indian butterflies, a pursuit that was recognized by his employers in India. De Nicéville was among the earliest entomologists to survey the Lepidoptera of the northeast of the subcontinent, recording some 630 species of butterflies during a tour of Sikkim, Bhutan and Darjeeling, the results of which he presented in a series of papers in *Journal of Royal Asiatic Society of Bengal* (1881–85).

De Nicéville had an encyclopaedic grasp of the butterfly fauna of South Asia, and on his appointment as a curator at the Indian Museum in Kolkata, collaborated with G. F. L. Marshall (1882–90) to write the three-volume *The butterflies of India, Burmah and Ceylon,* the final two volumes of which, according to the Preface by C. T. Bingham (1848–1908), were written by de Nicéville alone. Unlike many lepidopterists of his time, de Nicéville was interested in more than mere taxonomy and saw these insects in the light of their ecology, especially in an agricultural context (many moth larvae are considered agricultural pests).

The great Indian famine of 1899 resulted in George Nathaniel Curzon, the Viceroy of India, deciding "to endeavour for the first time to apply science on a large scale to the study and practice of Indian agriculture" in an effort to boost agricultural production in the subcontinent. Great emphasis was placed on the control of insect pests, and this led to de Nicéville's appointment to the grand title of Imperial Entomologist, responsible for advising on the control of insect pests. De Nicéville, however, was not to hold the appointment for long: he died in Kolkata in 1901.

Nietner, J.

Johan Nietner (? Potsdam –21 February, 1874) was a German naturalist chiefly interested in botany and entomology, who worked at A. & R. Crowe & Co. in Colombo in 1853, "by his industry and thrifty diligence" purchasing (together with Staniforth Green, apparently an uncle of E. E. Green (*q.v.*), who was also a keen entomologist: Haeckel, 1883a) Fernlands Estate, Pundulu Oya the following year, where he lived from then on. Nietner was a keen naturalist and collector, and described several new coleopterans from the island in *Journal of the Asiatic Society of Bengal* (1856, 25: 381–394, 523–554; 1857, 26: 132–153) and *Annals and Magazine of Natural History* (1857, (2)19: 241–249, 374–388). He was a pioneer

Courtesy of Deutsches Entomologisches Institut

Hermann August Hagen (1817–1893).

in the study of diseases of the coffee tree, publishing his *The coffee tree and its enemies* in 1858 (reprinted in 1861 and 1880). He is buried in the General Cemetery (Kanatta), in Colombo. Much of his insect collection is in Museum für Naturkunde, Berlin, the Universität Humboldt, Zoologisches Museum and the Deutsches Entomologisches Institut. In addition to specimens of Staphylinidae, Neuroptera and Diptera, important collections of Odonata were sent from Sri Lanka by Nietner to Hermann August Hagen (1817–1893), a German entomologist in Königsberg, who published descriptions of these in *Verhandlungen der Zoologisch Botanischen Gesellschaft in Wien* in 1858 (8: 478–481; 9:206–207). Haeckel (1883a) wrote of Nietner: "For a quarter of a century he was an indefatigable student of the natural history of Ceylon, and particularly distinguished as a discoverer of new insects. He unfortunately died shortly before his intended return to Germany."

Ormiston, W.

Walter Ormiston (born *ca* 1864) was from about 1888 a planter at Kalupahana, near Haldumulla. He was a keen lepidopterist and made extensive collections from the neighbourhood of Kalupahana, which he noted (Ormiston, 1917, 1924) was an exceptional location for butterflies:

> "A circle, with its centre at Haldumulla post office and a radius of 5 miles, includes a portion of the Horton Plains (7,200 feet), Ohiya (6,000 feet), Haputale (5,000 feet), Diyatalawa (4,400 feet), and low country with an elevation of about 600 feet only. In other words, the variation of elevation is at least 6,500 feet. Within this circle I have personally taken over 200 species [of butterflies and skippers] out of the 244 mentioned in these notes."

Ormiston's collection of Rhopalocera is in the Museum of the Bombay Natural History Society, while some his correspondence in the period 1920–1926 with entomologists including Norman Denbigh Riley (1890–1979) and Lambertus Johannes Toxopeus (1894–1951), numbering some 75 letters, are archived in the library of The Natural History Museum, London, where he spent two years studying the butterfly collections. Ormiston, a Fellow of the Entomological Society of London, is remembered mainly by his *Notes on Ceylon Butterflies* (1917, *Spolia Zeylanica*) and *The butterflies of Ceylon* (1924). He died on 12 August, 1935.

Phillips, W. W. A.

William Watt Addison Phillips (9 April, 1892–16 March, 1981) was educated in Yorkshire and determined at an early age to become a tea planter in Sri Lanka, following the footsteps of an uncle, David Kerr. A decline in the family's fortunes following his father's death in 1908 resulted in his being unable to complete his schooling. An abortive spell as a bank clerk convinced him that he should pursue a career more in tune with his passion

Courtesy of Mrs Eileen Wynell-Mayow

Courtesy of Mrs Eileen Wynell-Mayow

Above left and right, W. A. A. Phillips (1892–1981).

for natural history, and in 1911, aged 19, Phillips embarked for Sri Lanka to begin his planting career at Glasgow Estate, Agarapatana. From the outset, Phillips maintained diaries of his natural-history discoveries, soon accumulating also a menagerie.

With the outbreak of World War I in 1914, Phillips enlisted in the Ceylon Planters' Rifle Corps, and was in the course of the war promoted to captain. On secondment to the Indian Army's 24th Punjab Regiment, he served in present-day Iraq, being taken prisoner in April 1916 following the siege of Kut-al-Amara. It was during his internment as a prisoner of war (during which he was presumed to have died and appropriately honoured by the tea planters back in Sri Lanka) that Phillips resolved to fill a prominent gap in the natural-history literature of Sri Lanka by writing a comprehensive work on the island's Mammalia. Following the armistice of November 1918, Phillips resigned his commission and returned to Sri Lanka in late 1919.

Tea planting once again, Phillips was fortunate to be posted to estates in different parts of the country that were also rich in biodiversity—the wet-zone lowlands, the hill country, the Uva highlands—allowing him over the years to make collections and observations of the entire range of bird and mammal fauna Sri Lanka had to offer. In 1924, Phillips decided he needed training in taxonomic (and taxidermic) techniques and arranged a spell at The Natural History Museum, London. He married the following year, and returned to Sri Lanka, where he set about writing *The mammals of Ceylon,* published in 1935. The book was a *tour de force*, encompassing everything that was known about all the species (and subspecies) of the island, in many cases including observations on breeding, behaviour, habitat and distribution, far surpassing the earlier 'Indian' treatments of Jerdon, Sterndale and Blanford. The work (which he partially updated in a second edition in the 1980s), remains the standard taxonomic *fauna* of the mammals of Sri Lanka.

Ludwig H. Plate (1862–1937).

After publication of *Mammals,* Phillips turned his attention once more to the birds, his first love. He devoted hours of labour to photographing nests and nesting birds, and espousing the cause of conservation in Sri Lanka. He retired in 1956, and after a collecting expedition to the Maldives, withdrew to England, where he remained active until his death in 1981.

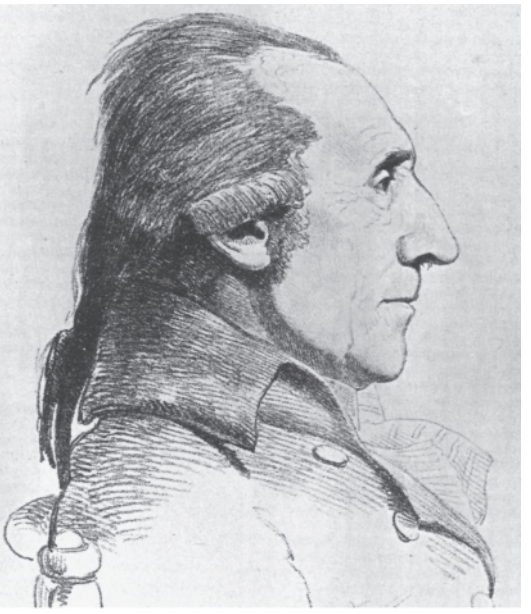
Plate, L.

Ludwig Hermann Plate (16 August, 1862–16 November, 1937) obtained his PhD from Jena University, Germany in 1886 (his thesis was on Rotifera), going on to lecture in zoology at the Veterinary College (Tierärztliche Hochschule) in Berlin. In 1909 he became director of the Institute of Zoology of Jena University on the retirement of Ernst Haeckel (*q.v.*). An indefatigable traveller, Plate soon embarked on overseas expeditions to a variety of countries, including the Americas, Greece and the Bahamas. In 1913–14 he visited Sri Lanka, based on which he produced (in German) his four-volume *Fauna et Anatomia ceylanica* (1922–1931). This massive work broke new ground in terms of detailed examinations of rarely-studied animals, including caecilians, veronicellid slugs, leaf insects, chitons and reef fishes. The studies themselves cover an astonishing variety of fields, including biology, anatomy, systematics, biogeography, phylogeny, morphology, ontogeny and musculature, with many of the accompanying plates showing histological sections in remarkable detail.

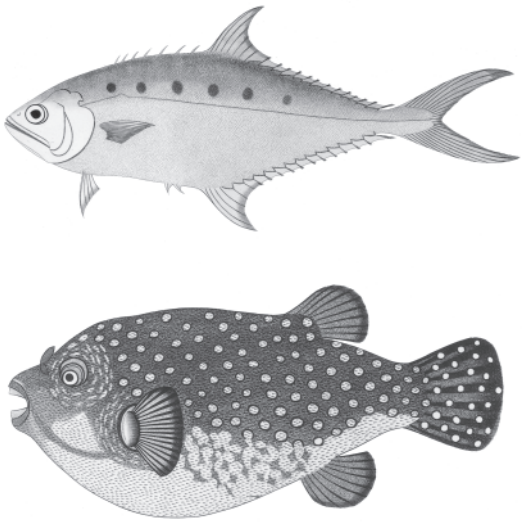
Plate made important (if not enduring) contributions to evolutionary theory, using his expeditions to gather materials for studies in comparative anatomy. He was a pioneer in combining morphological analysis with genetics and evolutionary theory, going on to write a 3,000-page, three-volume treatise on genetics (*Vererbungslehre*). A firm advocate of Darwinism, Plate, however, held that natural selection alone could not explain the alteration of numerous unrelated characters in an organism in the evolutionary process. Instead he believed that "the harmonious modification of numerous features is much easier [to conceive] from the Lamarckian standpoint…" (Plate, 1913: 224, trans. Levit and Hoßfeld, 2006).

Plate's place in science was clouded, however, by an acrimonious dispute he had with Haeckel (Levit and Hoßfeld, 2006), which resulted in the former gaining a legal victory, but at the cost of seriously tarnishing his place in posterity. His ill-concealed anti-Semitism and close links with the National Socialist (Nazi) Party did not help, either. Nevertheless, in terms of contribution to 20th-century zoology in Sri Lanka, Plate's work seems comparable in scope only with that of Herdman (*q.v.*) and the Sarasins (*q.v.*).

As a study of Sri Lankan natural history, Ludwig H. Plate's 2,370-page *Fauna et Anatomia zeylanica* (1922–31) is comparable in size and detail only with W. A. Herdmann's (1903–1905) 1,500-page *Report to the Government of Ceylon on pearl oyster fisheries of the Gulf of Manaar.* Above, *Plaxiphora platei*, a new species of chiton (marine molluscs usually occurring in the intertidal zone), illustrated in vol. 3, pl. 32 of *Fauna et Anatomia zeylanica;* and below, an illustration of stages and sexes of the leaf insect *Phyllium pulchrifolium* in vol. 1, pl. 11 of the same work.



The hump-nosed viper, *Hypnale hypnale,* is one of the many species of South Asian snakes that were described on the basis of illustrations in Russell's *An account of Indian serpents* (1796, 1801).



The exquisite plates of Patrick Russell's (1805) *Descriptions and figures of two hundred fishes collected at Vizagapatam on the coast of Coromandel* serve as the foundation of South Asian ichthyology. Russell provided only local common names for these species, many of which were then awarded formal scientific names by later authors. Shown here are his Aken Parah (*Scomberoides* sp.) above, and his Bondaroo Kappa (*Arothon* sp.), below.

Russell, P.

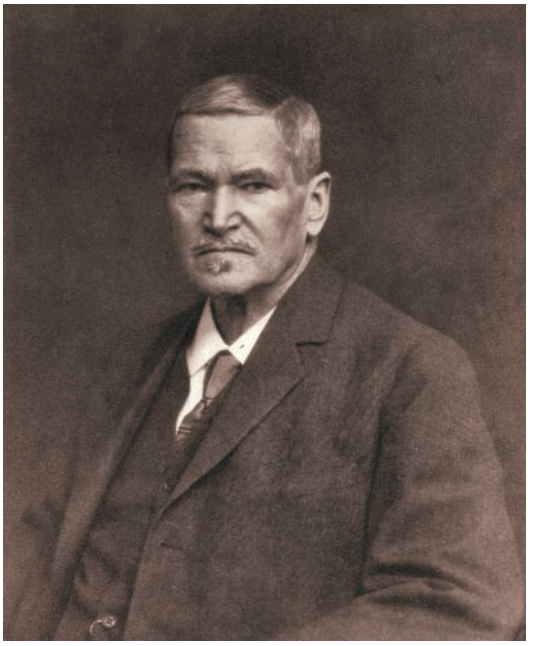
The pioneer in the study of the snakes of southern India was Patrick Russell (6 February, 1726–2 July, 1805), a Scottish doctor. Having served as a physician in Aleppo, Syria, where his older brother was stationed, from 1750–72, Russell returned to practise in Britain. In 1782 he accompanied his younger brother, Claude (an officer of the East India Company), to India, and settled in Visakhapatnam on the Coromandel coast, north of Madras (now Chennai). Three years later he was appointed naturalist to the East India Company, and in 1787 issued a guide to the identification of the venomous snakes of the region (Hagwood, 1994).

While at Visakhapatnam Russell commissioned local artists to make drawings of the snakes and (mostly marine) fishes of southern peninsular India, principally the present-day states of Tamil Nadu, Kerala and Karnataka, though many of his specimens came from farther afield. He also built up a considerable herbarium. After his return to Britain in 1789, he lived in London and continued to write until his death in 1805, at which time much of his work was still incomplete. While his *Natural history of Aleppo* (1794) was received well enough to be translated into German, his herbarium became the foundation of a three-volume illustrated flora of eastern peninsular India by William Roxburgh (1751–1815), to which Russell himself contributed a preface.

In addition to the plants of Tamil Nadu (1795–1819), Russell's place in history stems largely from his works on the snakes (1796; 1801–2) and fishes (1803) of Visakhapatnam, which were sponsored by the East India Company. While these richly illustrated books served to create few valid (i.e. Latin binomial) new names for the animals described in them, the illustrations were to become 'iconotypes' for species-descriptions by several other naturalists in the years immediately following their publication (*Serpents* contained hand-coloured plates, whereas *Fishes* contained only engravings). For example, Russell's viper, *Daboia russelii* was described and named by George Shaw (1751–1813) and Frederick Polydore Nodder (?1773–1800), on the basis of the plate in Russell's book. Although they contained descriptions and illustrations only of Indian species, Russell's works are by extension important to Sri Lanka because many of the species illustrated in them occur in the island, including Russell's viper.

Sarasin, P. B. and Sarasin, K. F.

Paul Benedikt Sarasin (11 December, 1856–7 April, 1929) and Karl Friedrich 'Fritz' Sarasin (03 December, 1859–23 March, 1942) were cousins, both born to a patrician family in Basel, Switzerland. Paul, whose father was a



Courtesy of Naturhistorisches Museum, Basel

Paul B. Sarasin (1856–1929).

Courtesy of Naturhistorisches Museum, Basel

'Fritz' Sarasin (1859–1942).

wealthy city councillor, was the third son, a difficult child who hated school. He entered university in Basel to study medicine, and although he endured the course, made it clear that he did not enjoy it. After qualifying as a doctor, he went to Würzburg, Bavaria, for postgraduate studies in zoology under Karl Semper, whose evolutionary researches, seeking a synthesis between Lamarckianism and Darwinism, were at the time receiving much attention. Semper (e.g., 1881) hypothesized that variability within species, matched with environment, exerted a selective pressure that would favour some specimens and populations more than others, and tested this extensively with examples both in the field (including the Philippines) and the laboratory.

While Paul was thus engaged at Würzburg, he was joined in 1881 by his cousin, Karl Friedrich Sarasin, known throughout his life by the diminutive, Fritz. Like Paul, Fritz was the son of a wealthy Basel official, for some time the mayor of that city, who had, however, died when Fritz was just two years old. Unlike Paul, Fritz had throughout his school career been a brilliant student, topping his batch at the matriculation. He went initially to university at Geneva, where he studied zoology and sought to perfect his French (the native tongue of both cousins was German). Abandoning that venture after just one semester, Fritz too, had enrolled for medicine at Basel, following his studies through to internship. It was here that he got intimately to know his cousin, three years his senior, linked initially by their common interest in zoology.

Paul's PhD dissertation, for which he received the honour of a *doctor summa cum laude*, was on the embryonic development of the European freshwater snail, *Bithynia tentaculata*. In 1882 the cousins joined Semper on a marine biology tour to Villefranche sur Mer on France's Côte d'Azur, where they toyed with the idea of establishing a marine research institute. They had by then, however, begun to suspect Semper's sanity, and the trip proved to be a watershed in that they severed ties,

A Veddah couple from Nilgala, photographed by Paul and Fritz Sarasin. During their travels in Sri Lanka, the cousins photographed hundreds of aboriginal people in the island, reproducing many of these portraits in their four-volume masterpiece, *Ergebnisse naturwissenschaftlichter Forschungen auf Ceylon*.

both academic and personal, with their guru from then onwards.

While at Würzburg the cousins became fascinated with the idea of conducting zoological explorations in Sri Lanka and began planning an expedition, to commence immediately after Paul's doctoral graduation. They were both of ample private means, and seem to have decided to use this wealth to finance lives in the service of natural history. In preparation for this, Paul set off on a tour of the natural history museums in London and Paris, where he examined Sri Lankan material, while Fritz took charge of logistics. In October, 1883, they departed for Colombo, and on arrival in the island, went straight up to Peradeniya, where they rented a bungalow with extensive gardens. Here they began their studies, initially on the larval development of the caecilian, *Ichthyophis glutinosus*, a snake-like limbless amphibian which, though already known at the time of Linnaeus, had never been closely studied.

Soon a steady stream of 'coolies' were bringing them caecilians in large numbers, enabling their pioneering work on reproduction and larval ecology of this species. Living in close proximity to the Royal Botanic Gardens, the Sarasins were quick to make the acquaintance of Henry Trimen, the director, through whom they obtained the services of the de Alwis brothers to make exquisite illustrations of the animals they were studying. Even as all this was going on, the Sarasins made numerous excursions into the Sri Lankan countryside. These were not short country walks or collecting trips: they were long journeys undertaken on foot, accompa-

nied by a file of native porters. In all, the Sarasins *walked* nine times from Kandy to the farthest regions of Sri Lanka—Colombo, Nuwara Eliya, Trincomalee, Batticaloa—a distance they estimated to be in excess of 1,000 km. It was, Fritz wrote later, "the only way to see a country". Thus it was that they first (and unexpectedly) came into contact with the Veddahs (Vanniyé Aetto), inspiring future visits to conduct research on anthropology, ethnography and prehistory, disciplines until then alien to them.

Part of their research agenda was to study elephant embryos in an attempt to test Ernst Haeckel's (*q.v.*) hypothesis (see pp. 145–146) that ontogeny recapitulates phylogeny. To do this it was necessary first two kill a series of pregnant cow elephants at various stages of gestation, but did not realise until then that it is difficult even for specialists to tell a pregnant cow from one that is not until the advanced stages of pregnancy. Having killed and dissected two female elephants (in the course of twenty elephant hunts, all on foot), the Sarasins decided they had no stomach for slaughter and abandoned this aspect of their research. They were able, however, to capture a baby elephant which, after living with them for a while, was shipped to the Basel Zoo.

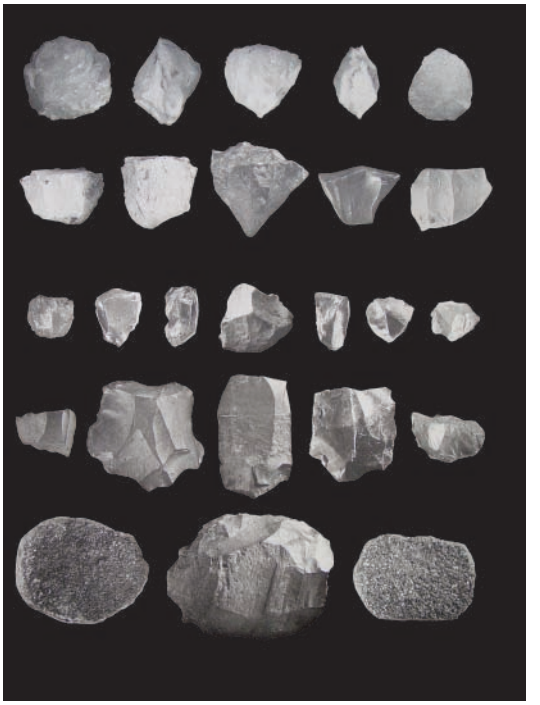
At Trincomalee the cousins shifted their attention to the marine fauna, discovering and describing for the first time, for example, the ocular anatomy of sea urchins. They also determined experimentally that sea stars are able to regenerate severed limbs, going on to describe also the parasitic molluscs that live on these echinoderms.

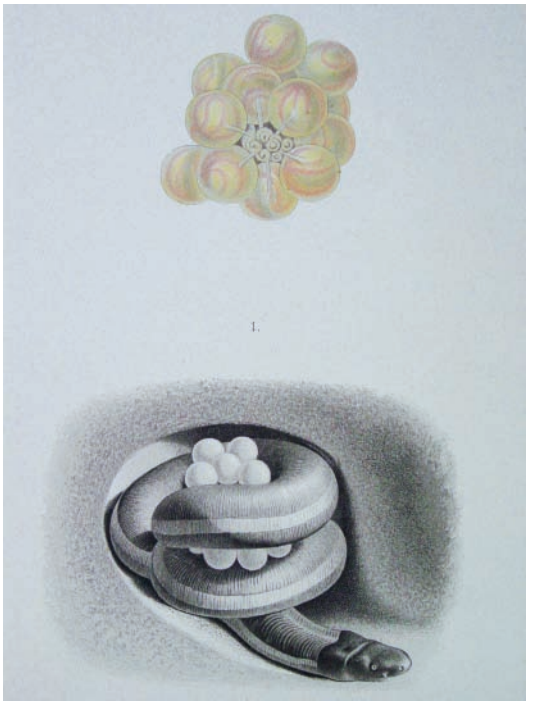
After a sojourn of two-and-a-half years, in the Spring of 1886, the Sarasins departed Sri Lanka, carrying with them several crates of specimens. Avoiding returning to Basel, they were to base themselves for the next six years in Berlin, where they wrote and published their monumental *Ergebnisse naturwissenschaftlichter Forschungen auf Ceylon* ['Results of natu-

A Sri Lankan Veddah aborigine in the 1880s, complete with bow and arrow, but modestly attired in a skirt of leaves, evidently at the request of the Sarasins.

Opposite –

The cousins Paul and Fritz Sarasin visited and worked in Sri Lanka from 1884–86, exploring various aspects of zoology, archaeology and anthropology. These illustrations, taken from the plates accompanying their four-volume *Ergebnisse naturwissenschaftlichter Forschungen auf Ceylon* (1887–1908), reflect the diversity of their interests and the range of their study, in a period of just three years. The Sarasins provided the first detailed knowledge of Sri Lanka's Stone Age, throwing light on ornaments made from molluscs, and bone and flint tools. They also hired members of the family of botanical illustrators based at Peradeniya, the de Alwis Seneviratnes (*q.v.*), to draw a large number of exquisitely detailed figures, such as *Ichthyophis glutinosus* guarding its eggs, and a number of marine invertebrates for their book.

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ral history researches in Ceylon'], the first volume of which appeared in 1887.

In Berlin, the duo came under the influence of Baron Ferdinand Paul Wilhelm von Richtofen (1833–1905), who became something of a role model to them. Richthofen, an accomplished geographer and geologist, was an archetype explorer, having previously made expeditions to Sri Lanka, Japan, Taiwan, Sulawesi, Java and the Philippines. As were their subsequent visits to Sri Lanka and Sulawesi, the Sarasins' *Ergebnisse* too, was clearly modelled on Richthofen's best-known work, *China, Ergebnisse eigener Reisen und darauf gegründeter Studien* (5 vols.+atlas, 1877–1912). It was also Richthofen who, on hearing of the Sarasins' initial encounters with the Veddahs, encouraged them to return to Sri Lanka with the specific purpose of studying this vanishing aboriginal population. This suggestion the cousins accepted with enthusiasm.

In 1889 the Sarasins toured Egypt, and the following year returned to Sri Lanka, taking in a tour of India *en route*. This time they arrived with elaborate photographic paraphernalia and again, travelled on foot to Hennebedda and Wewatte, where they photographed almost every Veddah they encountered, together with a number of Sinhalese and Tamils for purposes of comparison. Dozens of these portraits were published in a subsequent (1892) volume of *Ergebnisse*, and their founder-work on the Veddahs, *Die Weddah von Ceylon, und die sie umgebenden Völkerschaften.*

In 1896 the cousins returned to Europe, this time to Basel, where they purchased a large house which doubled as a museum and laboratory. This was to be their residence for the rest of their lives. Neither of them ever married: they appear to have been a homosexual couple, the relationship between them described politely by Fritz's biographer, Felix Speiser (1943), as "Freund und Lebensgefährte". Offered professorships at Basel University, both declined: they had neither the time nor the patience for teaching, besides which they appear to have had an inexhaustible supply of travel plans.

In 1901 they made an expedition to Sulawesi (the Celebes) and there again decided to walk all the way from the north to the south of the island. In these travels they were to discover Lakes Towuti and Matanna, in addition to a wealth of anthropological and zoological data. Paul navigated the duo through the wilds, meticulously charting their position each day with the aid of a sextant. They returned to Basel in 1903 with more crates of specimens, having been saved from death only narrowly at the hands of natives by the timely intervention of the Dutch army.

In 1907 the pair returned once more to Sri Lanka, this time to make excavations in caves they thought might previously been occupied by Veddahs, starting at Danigala. In the course of this work they discovered hundreds of stone tools, demonstrating that Stone Age people had inhabited the island in former times (they assumed these to be the progenitors of the Veddahs, though P. E. P. Deraniyagala since showed that the tools may have been developed by Late Pleistocene 'Balangoda Man', a lineage distinct from the Veddahs). This was to be the Saransins' last expedition together.

From 1907 onwards, Paul became increasingly interested in nature conservation and was a leading light of the Schweizerischen Naturforschenden Gesellschaft (the Swiss Natural History Society), and president of its committee for nature protection (Fritz was for six years, from 1904, president of the society itself). With this authority, Paul successfully led the movement to establish the National Park of Switzerland. Having seen the impact of man on nature in Sri Lanka, where the British were at the time destroying vast tracts of pristine rain forest for the plantation of tea, Paul was convinced that unless a global network of protected areas was

established, little would be left of the world's wilderness. This visionary ambition was not restricted to the tropics: he wanted the coverage of protected areas to be "from pole to pole", and in 1914 planned a visit to Spitsbergen, which he hoped would number among these parks, but the outbreak of World War I thwarted his plans.

After the war, Paul Sarasin invested much of his time in building up the Basel Museum as an ethnographic and zoological centre of international importance, while at the same time writing prolifically. He was in the eyes of many a savant, engaging at the same time in research on fields as diverse as (in addition to those detailed above) higher mathematics, the evolution of Greek temples and the work of Leonardo da Vinci. In his later years he also translated Aeschylus's *Prometheus* into German, and wrote a number of plays and poems (an activity about which he was rather embarrassed, causing him to use pseudonyms for their authorship). Towards the end of his life he was honoured with PhDs *honoris causa* by the Universities of Basel and Lausanne.

While Paul was occupied with nature conservation activities in Basel, in 1911–12 Fritz embarked on another tour, this time to New Caledonia, in the company of Jean Roux (1876–1939), curator of the Natural History Museum of Basel. Here, Roux focused on natural history (he was a competent herpetologist) while Sarasin engaged in his anthropological pursuits, concluding that an absence of stone tools on the island indicated that human colonization had been relatively recent there.

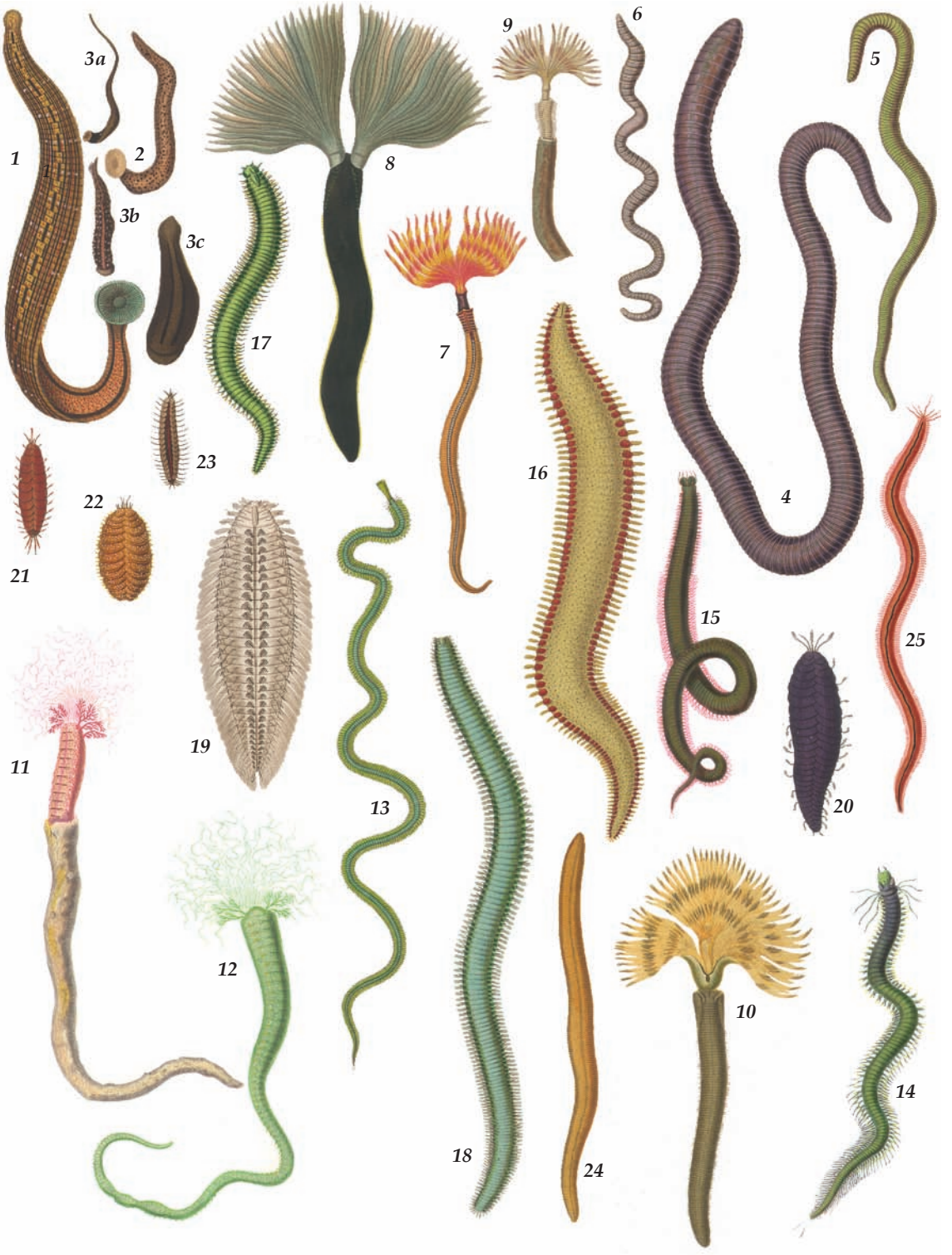
In 1919 Fritz founded the Swiss Society for Anthropology and Ethnography, but this did not stop him travelling. In 1925 he returned to Sri Lanka one last time, to try to unravel the island's prehistory, and thereafter travelled also to Thailand. His travelogue (Sarasin, 1939) paints a wonderful picture of their visits to Sri Lanka.

Schmarda, L. G.

Zoologist and geologist Ludwig Karl Schmarda (23 August,1819–7 April, 1908) studied science, especially zoology, at the universities of Olmütz and Vienna, and medicine at the Josephsakademie, also in Vienna. He worked as a physician prior to being appointed an assistant in natural history at the Josephsakademie, later becoming a professor the University of Graz in 1850, where he founded the Zoological Museum. In 1852 Schmarda moved to Prague, returning to Austria to hold the chair in zoology at Vienna from 1862–83. In 1870 he became a member of the Academy of Sciences of Vienna.

In 1853 Schmarda visited Sri Lanka and made collections in the company of the Austrian landscape artist Baron Hermann von Königsbrunn, making also the acquaintance of E. F. Kelaart, who named *Philautus schmarda,* a frog discovered by Schmarda at Adam's Peak, for the Austrian. An account of Schmarda's visit is given in his travelogue (Schmarda, 1861), and it was probably this work that inspired Ernst Haeckel (and later, Ludwig Plate) to visit the island, and especially to base himself at Weligama, where Schmarda too, made extensive collections that included the first land planarian to be described from Sri Lanka.

Schmarda travelled widely, making collections in South Africa, Australia, New Zealand and the Americas in addition to Sri Lanka. The collection of invertebrates he made in the course of this tour—almost 200 new species—were described in his (1859) *Neue Wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erdr* [sic] *1853 bis 1857 von Ludwig K. Schmarda* [New invertebrate animals observed and collected on a journey by Ludwig K. Schmarda around the world from 1853 to 1857]. His materials are lodged at the Naturhistorisches Museum in Vienna and a popular account of his travels provided in Schmarda (1861).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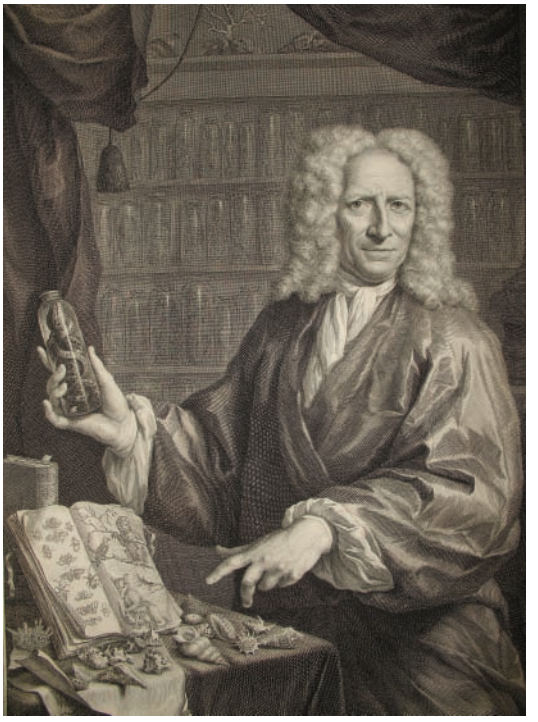


Albertus Seba (1665–1736).

Opposite -

Schmarda was fascinated by Annelida (segmented worms), of which he made extensive collections in both terrestrial and shallow marine habitats in Sri Lanka, South Africa, Australia, New Zealand, the Americas. Illustrated here is a selection of the new leeches, oligochaetes and polychaetes he described from Sri Lanka in the first of his two-volume monograph, *Neue turbellarien, rotatorien und anneliden* (Schmarda, 1859), in which he presented 191 new species. (The drawings are extracted from different plates, and have in some cases been reduced in size.)

1 Hirudo multistriata, 2 Hirudo flava, 3 Haemopsis ceylanica, 4 Perichaeta leucocycla, 5 Perichaeta viridis, 6 Perichaeta cingulata, 7 Sabella phaeotaenia, 8 Sabella melanchlora, 9 Sabella melanostigma, 10 Spirographis tricyclia, 11 Terebella tilosaula, 12 Phyzelia viridis, 13 Phyllodoce macrolepidota, 14 Mastigonereis longicirra, 15 Eunice teretiuscula, 16 Amphinome latissima, 17 Amphinome longicirra, 18 Amphinome indica, 19 Chloeia viridis, 20 Gastrolepidia clavigera, 21 Polynoe fusicirra, 22 Polynoe longicirra, 23 Polynoe peronea, 24 Bhawania myrialepis, 25 Diopatra phyllocirra.

Seba, A.

Albertus Seba (1665–1736) was born in Etzel, Lower Saxony, in Germany and later moved to Amsterdam, where he established a pharmacy near the harbour. Here, Seba commissioned sailors and ship's surgeons to bring him medicinal plants from across the world and especially the Dutch colonies which, at the time, included Sri Lanka. In many cases, he received animal specimens, too, either preserved entire, in alcohol, or as dried skins. As he grew increasingly prosperous, Seba's collection expanded to include his house, and he also began trading in specimens, many of which, previously unseen in Europe, evoked great curiosity among the aristocracy and scientific community.

In 1734 Seba published his *Locupletissimi rerum naturalium thesauri accurata descriptio,* with the Dutch subtitle, *Naaukeurige beschryving van het schatryke kabinet der voornaamste seldzaamheden der natuur* ('An accurate description of the very rich thesaurus of the principal and rarest natural objects'). The 446 hand-coloured plates of this work included several specimens from Sri Lanka, though in many cases, the localities were wrongly stated; in others, the drawings are not clear enough to facilitate unambiguous identification. Other taxonomists such as Linnaeus (*q.v.*) were later formally to name and describe many species based purely on Seba's drawings.

Seligman, C. G.

The son of a wine merchant, Charles Gabriel Seligman (24 December, 1873–19 September, 1940) was from his childhood interested in nature and natural history. With both his parents having died at about the time he finished schooling, Seligman won a scholarship to study medicine at St Thomas's Hospital in 1892, embarking on a career in pathology research after his graduation as a physician. A brief opportunity to engage in anthropological research came his way shortly thereafter,

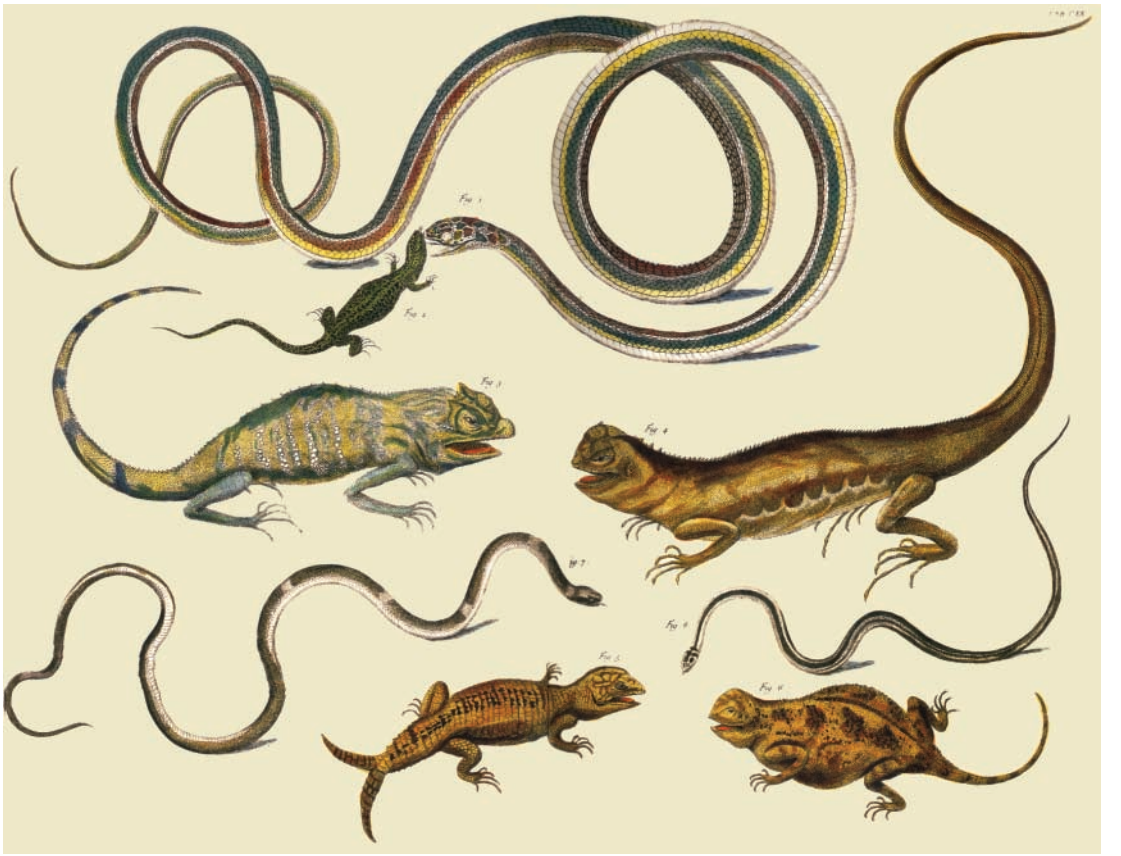


Plate 109 from Albertus Seba's (1734) *Thesaurus*. Seba stated that the snake shown as Fig. 1 was from Sri Lanka, but subsequent herpetologists have been unable definitively to assign it to a Sri Lankan species. The lizard shown as Fig. 3 (for which Seba did not provide locality information), however, is unambiguously *Lyriocephalus scutatus*, the only species included in this genus of agamid lizards, which is endemic to Sri Lanka.

Opposite –

The snake at the bottom of Plate 19 of Seba's *Thesaurus* is considered to be *Hypnale nepa*, a hump-nosed viper endemic to Sri Lanka's central highlands, showing that even in the early 18th century, collectors were penetrating deep into the Sri Lankan interior in search of specimens to feed the European appetite for 'curiosities'.

in his winning an appointment in an expedition to Thursday Island in the Torres Strait, and in 1904, to New Guinea. These two tours caused Seligman to decide that his future lay not in pathology by in anthropology (then a fledgling branch of science), resulting in his accepting an invitation by the colonial Government of Ceylon in 1907–08 to undertake a study of the island's fast-disappearing aboriginal people, the Veddahs (Vanniyé Aetto). This offer Seligman gleefully accepted, resulting in the first detailed study of the ethnography and sociology of the Veddahs (taking time off also to study the ethnology, prehistory and archaeology of Sri Lanka).

From 1909 onwards, Seligman shifted his focus to Sudan, culminating in his monumental (1932) *The Pagan tribes of southern Sudan*. In 1910 he came to terms with the fact that his career as a pathologist was behind him, accepting an offer from the London School of Economics to serve as a lecturer (later profes-

Charles Gabriel Seligman (1873–1940).

sor) in ethnology. During World War I, Seligman volunteered as an army doctor and served as a psychiatrist in a hospital for 'shell-shocked' patients.

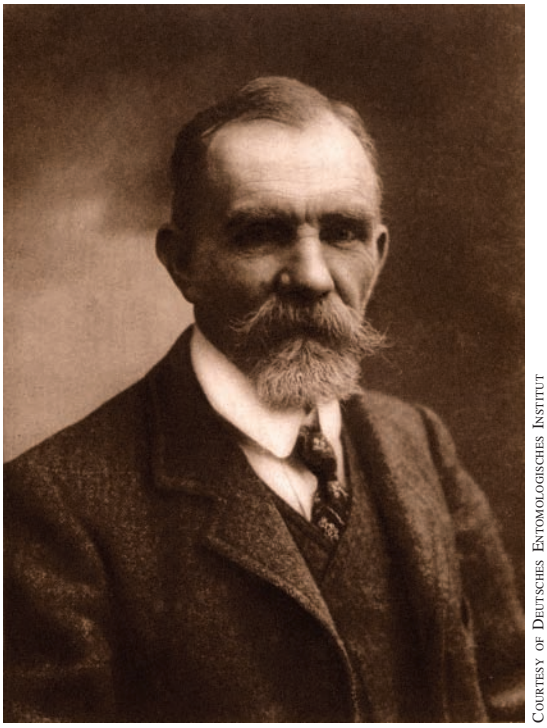
Seligman's visit to Sri Lanka resulted in his (1910) *The Veddahs* (Cambridge University Press), co-authored with his wife, Brenda Zara *née* Salaman, the first comprehensive text on this subject, and also his paper on the quartz implements from Sri Lanka published in *Man* (1908). Building on the work of the Sarasin cousins (*q.v.*), the latter especially helped give credence to the of Stone Age implements that were being discovered at the time by dilettante pre-historians such as Edward Green (*q.v.*), Thomas Farr and John Pole, setting the stage for the later study of the island's prehistory, e.g., by Siran Upendra Deraniyagala (01 March, 1942 –), and Kenneth Adrian Raine Kennedy (26 June, 1930 –).

Silvaf, P. A. H.

Philip Antoine Hippolyte Silvaf was born to parents he claimed were French, in Pondicherry, a French settlement in southern India, on 8 January 1801. The unusual surname Silvaf appears to be a corruption of the popular Portuguese-Sri Lankan name Silva, the F being added to his signature possibly to denote *fils* or *facit.* Silvaf appears to have arrived in Sri Lanka in the early 1820s (Pethiyagoda and Raheem, 1996), and in 1832 married Wilhelmina Gertrude de Haan of Negombo. He lived in Pettah, then a suburb of the Fort of Colombo, where he made a living by giving lessons in painting and music. Between 1830 and 1840, he worked part time as illustrator to the Military Museum in Colombo, and in 1839 he dedicated and presented to the island's governor, Sir Wilmot Horton (1784–1841), a series of some 15 drawings of Sri Lankan costumes in the (as it turned out, futile) hope that he would cause them to be published.

Between 1845 and 1850 Silvaf had some success as a painter of miniatures and a producer of hand-coloured daguerreotype portraits. In search of better prospects, *ca* 1853 he relocated to Kandy, where he established an art school in Brownrigg Street. Despite demand for his services as an illustrator (e.g., of Alistair Mackenzie Ferguson's (1816–1892) *Souvenirs of Ceylon* (1968) and J. Emerson Tennent's *Sketches of the natural history of Ceylon* (1861)), Silvaf's school was a failure. He died in Negombo on 9 April, 1879. His greatest contribution to Sri Lankan natural history probably was the collection of 610 detailed watercolour studies of freshwater and marine fauna (mainly fishes) he executed for Emerson Tennent (*q.v.*). After having disappeared from the record for more than a century, 587 of these were located in a private collection in the Netherlands in 1992 and purchased for the National Museum by the Wildlife Heritage Trust.

Drawings of Sri Lankan reef fishes by Hippolyte Silvaf, commissioned by James Emerson Tennent.

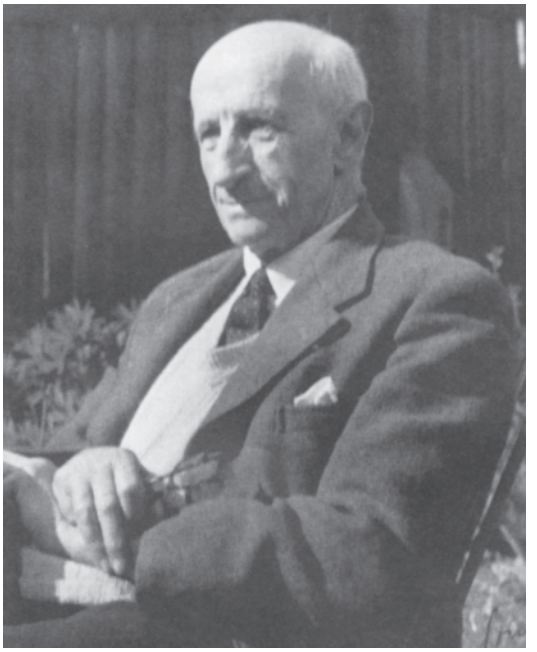


Courtesy of Deutsches Entomologisches Institut

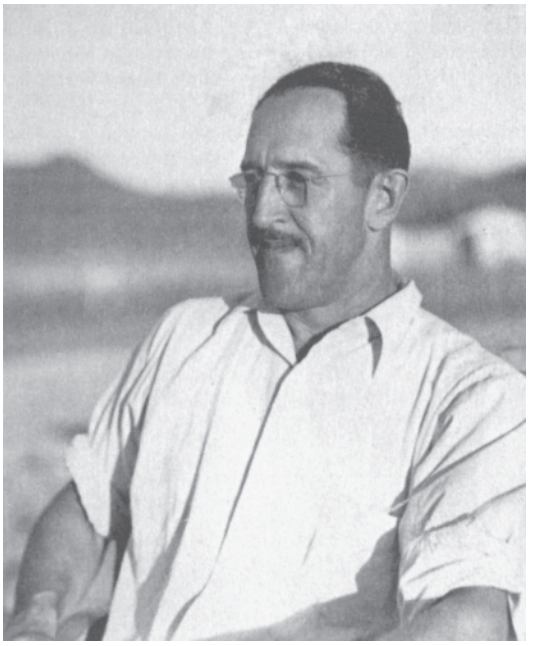
Eugène Simon (1848–1924).

Simon, E.

Born on 30 April, 1848, Eugène Simon dedicated his life to arachnology (the study of spiders), rising to become the president of the Société entomologique de France. Having inherited a considerable fortune, he was able to indulge in his passion by travelling the world making extensive collections of spiders (and insects), on which he worked at the Muséum National d'Histoire Naturelle in Paris. Simon visited and made collections in Sri Lanka in January–February 1892, the best known among which was probably not any of his spiders but his eponymous endemic relict ant, *Aneuretus simoni*, the only member of the formicid subfamily Aneuretinae, which was described by Carlo Emery the following year. Simon is remembered especially for two colossal works, *Histoire naturelle des araignées* ['Natural history of spiders'], published in two volumes totalling 2,164 pages, and *Les Arachnides de France*, the last parts of which



Malcolm A. Smith (1875–1958).



Edward H. Taylor (1889–1978).

were published posthumously (he died on 17 November, 1924).

Smith, M. A.

Malcolm Arthur Smith (1875–22 July, 1958) was a Surrey-born physician turned herpetologist who spent much of his life studying the reptiles and amphibians of tropical Asia, including Sri Lanka. Smith initially worked as a doctor in order to make a living and to pay for his natural-history interests but in 1902 gave up his London practice and travelled to Thailand, where he became medical officer to the British legation there, and also physician to the royal court. He retired in 1925 and withdrew to The Natural History Museum in London, where he was provided with facilities to conduct his private research. He now had an opportunity to work on the Indian and Sri Lankan reptile and amphibian specimens accumulated by his predecessors at the museum, including J. E. Gray, Albert Günther and G. A. Boulenger (Smith had links to India, his father having served there as an engineer). His reptile trilogy in the *Fauna of British India* series (crocodiles and turtles, 1931; lizards, 1935; and snakes, 1943) remain the definitive taxonomic works on this fauna even now. The volume on amphibians was never completed.

Taylor, E. H.

Edward Harrison Taylor (23 April 1889–16 June 1978) was born near Kansas City, Missouri, where he attended university, going on to serve in the Philippines (then a United States territory). Returning to America to complete his master's degree in 1916, Taylor went back to the Philippines where, working at the Bureau of Science in Manila, he embarked on a career of exploration and herpetological research (Adler, 1989), becoming head of the Department of Zoology of the University of Manila in 1921. He then went on to work in Mexico, Costa Rica, Thailand, China and Sri Lanka. Taylor wrote three important herpet-

ological papers on Sri Lanka, based largely on explorations he made in the thorn-scrub jungles between Trincomalee and Nilaveli (Taylor, 1947–1953b). He was a gifted field collector, combining his love for exploration with part-time gathering of overseas intelligence for the United States, and ended his career at the University of Kansas, where he founded an influential academic lineage of herpetologists.

Templeton, R.

Robert Templeton (12 December, 1802–2 June, 1892) was born in Belfast, Northern Ireland. His father, John Templeton, a prosperous businessman, was a keen student of natural history, especially botany (his interest was sufficiently advanced for him to be in correspondence with many of the most eminent botanists of his day, including Sir Joseph Banks and Sir William Hooker). Robert, who as a child frequently accompanied his father on collecting trips around Belfast, was by his late teens himself a keen student of natural history. At 19, he entered Edinburgh University as a medical student, graduating, however, only in 1831. His protracted career as a student may have been the result of his natural history pursuits at the time, during which he also had to deal with his father's death (1825) and the publication of the latter's manuscript notes.

Robert Templeton was active both as a botanist and an entomologist. At about the time he left for university, he donated a herbarium of Irish plants to the Belfast Museum, and by the mid-1820s had accumulated a considerable cabinet of insects. He was already a competent amateur entomologist by the time he graduated from Edinburgh, and his *Thysanurae hibernicae* ('The bristletails and springtails of Ireland') was published in *Transactions of the Entomological Society of London* in 1836. In this he described two new genera and 12 new species, illustrated in intricate anatomical detail. His work was widely recognized, and the genus *Templetonia* (Lubbock, 1875) was named in his honour.

Having worked on the description of several species of spiders and mites after graduating from university, Templeton was in May 1833 commissioned as Assistant Surgeon in the Ordnance Medical Department of the Royal Artillery. Initially stationed at Woolwich, he was the following year transferred to Mauritius. Having indulged in his passion for natural history there, too, in 1835 he was recalled to London and posted to Rio de Janeiro, Brazil, in 1835. From Rio, the same year, he took a passage to Colombo *via* the Cape of Good Hope, having taken time to collect a new species of *Gerris* (pond skater) in the mid-Atlantic. Nothing is known of Templeton's first visit to Sri Lanka except that it was brief: having returned to England he was in April 1836 posted to Malta, and proceeded to collect insects and marine invertebrates in the Ionian islands.

In 1839 Templeton was posted to Sri Lanka, and was to live on the island for the next 12 years, much of which he spent on collecting and studying various groups of insects, including butterflies and moths. He began an extensive correspondence with Edward Blyth (*q.v.*) at Kolkata, and was also a source of great inspiration to Edgar Layard (*q.v.*).

The duo worked closely together, collecting almost 3,000 invertebrate specimens (including some 930 Lepidoptera), which were reported on by a number of taxonomists in Europe, including John Blackwall (1790–1881) (spiders); Joseph Sugar Baly (1816–1890), Francis Polkinghorne Pascoe (1813–1893), Francis Walker (1809–1874) and John

Following pages: A montage of Robert Templeton's drawings of Sri Lankan butterflies in the collection of the Ulster Museum (by permission of the Ulster Museum, Belfast).

Courtesy of the Ulster Museum, Belfast

Courtesy of the Ulster Museum, Belfast

Silhouette of Robert Templeton (1802–1892).

Obadiah Westwood (1805–1893) (dragonflies and beetles); Frederic Moore (*q.v.*), Francis Walker (wasps, beetles) and George Robert Gray (1808–1872) (dragonflies, butterflies and moths). Templeton's own publications on Sri Lankan invertebrates were, however, few: the giant earthworm, *Megascole caeruleus;* two new species of slugs, and two papilionid butterflies. New species of birds discovered by him in Sri Lanka included several endemics such as the Chestnut-backed owlet (*Glaucidium castanonotum*), Spotted-winged thrush (*Zoothera spiloptera*) and Orange-billed babbler (*Turdoides rufescens*): these were reported on by Edward Blyth.

Templeton married Mary Slade in 1851, and one of his sons, Robert Stanser Templeton, later become Surveyor General of the island. Robert Templeton himself was recalled to England in 1852, and went on to serve with distinction in the Crimean War, during which he was promoted to Surgeon Major. He continued his researches after the war, and his last known paper was a description of the slug *Vaginula maculata* from Sri Lanka in *Annals and Magazine of Natural History* in 1858. By the time of his retirement in 1860, he had reached the honorary rank of Deputy Inspector General of Hospitals. Although he lived for another 32 years, he appears to have abandoned the study of natural history in his retirement: he published nothing during this time. His manuscripts are now in the Belfast Museum, while the bulk of his invertebrate collections are in The Natural History Museum, London (Nash & Ross, 1980).

Tennent, Emerson – see Emerson Tennent, J.

Wadia, D. N.

Darashan Nosherwan Wadia (23 October, 1883–15 June, 1969), was born in Surat, India, and received his higher education at Baroda. Wadia taught himself geology and in 1917 won a lecturing appointment in geology at the Prince of Wales College, Jammu, where he remained for 14 years, after which he transferred to the Geological Survey of India. After retirement in 1938, he was appointed Government Mineralogist of Sri Lanka, a post he held until India's Independence in 1947, when he was offered the first directorship of the Indian Bureau of Mines. He was later promoted head of the Atomic Minerals Division of the Indian Atomic Energy Commission (Auden, 1970).

Wadia was deeply interested in tectonics and orogenesis (mountain formation), and made important contributions with regard to the formation of the Himalayas, the Western Ghats and the mountains of Sri Lanka. His identification of the plains of erosion in Sri Lanka (Wadia, 1941a,b) not only facilitated important research on Sri Lankan biogeography and climate, but also remains the standard work on orogenesis in Sri Lanka to this day. Although strictly not a 'natural historian', he is included here because his work was fundamental to work on the distribution of plants and animals within Sri Lanka.

Wait, W. E.

Walter Ernest Wait (1878–1971) was educated at Fettes College, Edinburgh and Edinburgh

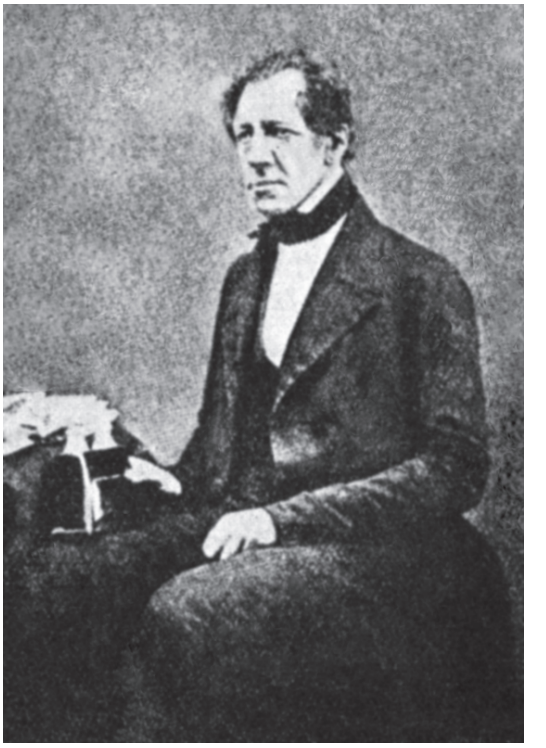
University, where he received his MA. He was recruited to the Ceylon Civil Service, arriving in the island in 1902 (Henry, 2000). A keen ornithologist, Wait was an avid collector of birds' eggs, which are now in the birds' egg collection of The Natural History Museum at Tring, England. He was also the author of *Manual of the birds of Ceylon* (1925), the first general ornithological work after Legge. A close associate of G. M. R. Henry, he wrote the accompanying text for the latter's *Coloured plates of the birds of Ceylon* (1927–35). Wait rose to be Chief Secretary to the Government (being decorated with a CMG for his services), and finally returned to England in 1934.

Walker, F.

Born in Southgate, England, on 31 July, 1809, Francis Walker was from 1844–83 an entomologist at the British Museum. He was a prolific describer of new species, and few groups of insects were spared his attention: he published catalogues of several insect groups in the museum's collections, including Diptera, Homoptera, Hymenoptera, Lepidoptera, Neuroptera and Orthoptera. Widely regarded as being a careless taxonomist, however, Walker created a wealth of synonyms among the *ca* 20,000 taxa he created in his lifetime.

So notorious was Walker for careless work that when he died, on 5 October, 1874, at least one fellow entomologist heaved a sigh of relief. An unkind obituary by J. T. Carrington in the *Entomologist's Monthly Magazine* (1874, 11: 140–141) began, "More than twenty years too late for his scientific reputation, and after having done an amount of injury almost inconceivable in its immensity, Francis Walker has passed from among us." Nevertheless, his contribution to entomology was immense.

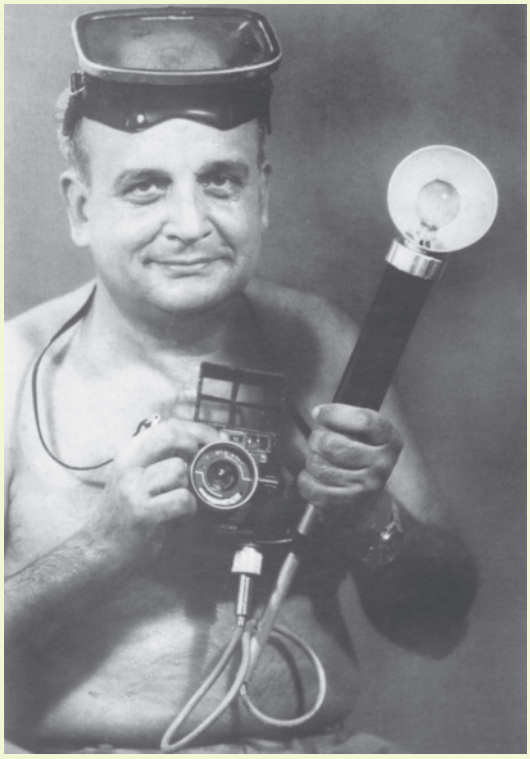
In writing his *Ceylon* (1859), James Emerson Tennent (*q.v.*) sought Walker's in compiling a checklist of Sri Lankan insects. Having examined the collections of the British Museum and the museum of the East India Company, and insect collections sent to London by G. H. K. Thwaites (*q.v.*), J. Nietner (*q.v*), R. Templeton (*q.v*) and E. L. Layard (*q.v.*), among others, Walker compiled the first inventory of Sri Lankan insects, numbering some 2,000 species, published in Tennent's book.

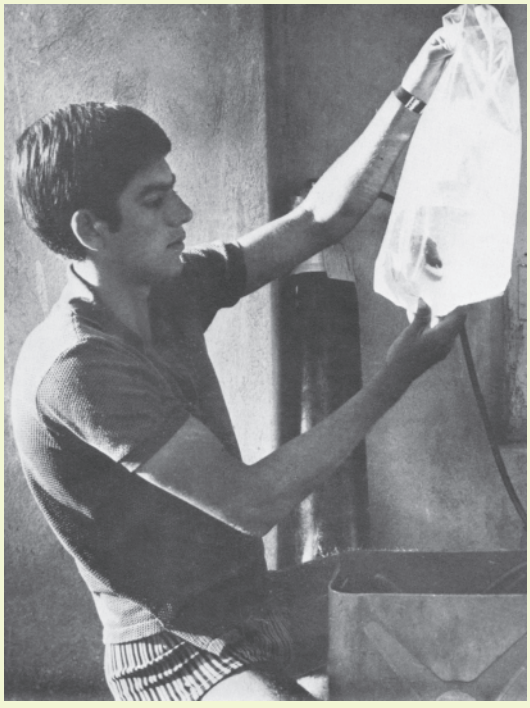


Francis Walker (1809–1874).

Wall, F.

Frank Wall (21 April, 1868–19 May, 1950) was born in Nuwara Eliya, Sri Lanka. His father, George Wall (1821–1894, *q.v.*) was a planter in addition to being a keen pteridologist, having published a *Catalogue of ferns indigenous to Ceylon* (1873). George became enormously wealthy from his early investments in coffee, but lost almost all his fortune with the collapse of that crop in the 1860s. At the height of his career, he was a member of the Legislative Council and editor of the influential *Ceylon Independent.* George was also a close friend and associate of G. H. K. Thwaites (*q.v.*).





Opposite –

Despite the decline of zoological exploration in Sri Lanka in the early post-Independence era, a handful of men committed to exploration continued to feed the European appetite for specimens, whether through personal interest, for science, or the pet trade. They are remembered largely by a plethora of eponymous species. The four individuals figured here were all recognized in their own lifetimes for their encyclopaedic knowledge of Sri Lanka's wilderness and its biodiversity, both marine and terrestrial. While their direct contribution to science was modest, working alongside scientists they caused the novelties they discovered to be described, in turn enriching knowledge of Sri Lanka's biodiversity, and informing and enabling vital conservation actions.

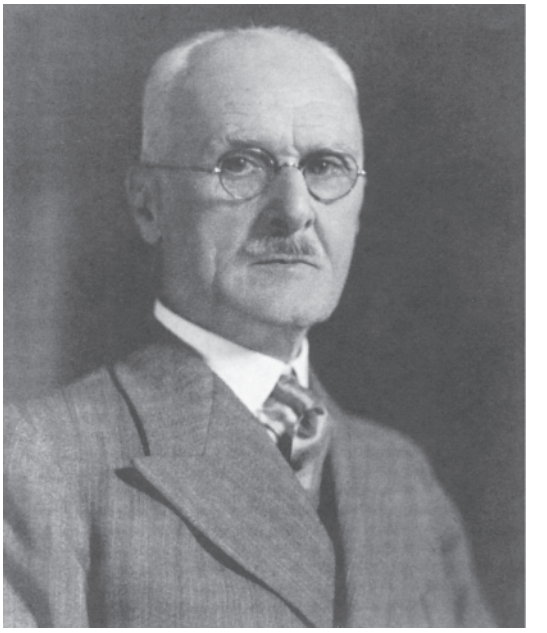
Clockwise, from top left, Rodney Jonklaas (11 July, 1925–23 September, 1989), Vickremadhira ("Vicky") Gunawardena Wijetillake Atukorala (4 September, 1915–29 June, 1982), Cedric Douglas Martenstyn (5 October, 1946–), and Galketiyagodagedera Mahantemudiyanselage Punchi Banda Karunaratne (16 January, 1930–14 June, 1996).

Jonklaas, who was for some years a deputy director of the Dehiwala Zoo, led a colourful life between collecting specimens, breeding fish, horticulture and acting for the cinema. Like him, Martenstyn was of Dutch descent; both were competent scuba divers and expert collectors of freshwater and marine organisms. Of independent means, Cmdr. Martenstyn was a volunteer officer in a naval commando unit when he went missing after the helicopter in which he was travelling was shot down over the Jaffna peninsula on 22 January, 1996.

Karunaratne was from 1953 for two decades an assistant in entomology at the National Museum. An expert field worker (though unlike the other three, not a scuba diver), he collaborated closely with workers such as Karl Krombein (*q.v.*) in the Smithsonian Insect Project, and also led the field component of the Forest Department's 1996 National Conservation Review.

Described by contemporaries as eccentric, maverick and non-conformist, Atukorale too, worked for some years at the zoo, spending his later years helping students of zoology with their field work, almost to the point of establishing an academic lineage of his own.

The tradition of field biology that took root in Sri Lanka in the 1980s owes itself largely to the selflessness with which these four men mentored a number of younger workers who, being more academically inclined, benefited enormously from their intimate knowledge of the Sri Lankan wilderness and its biodiversity.



Frank Wall (1868–1950).

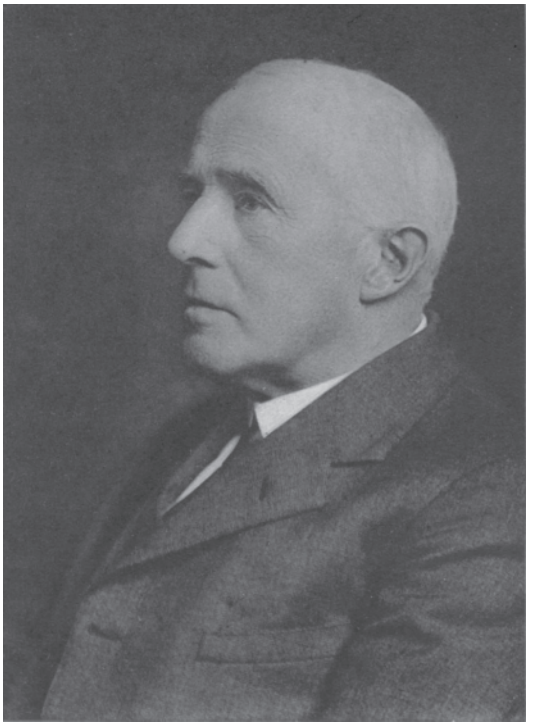
Frank qualified as a physician at Middlesex Hospital, London, in 1892 and entered the Indian Medical Service the following year. Between 1894 and his retirement in 1925, he served in many parts of India in addition to Burma and Sri Lanka, collecting snakes everywhere he was stationed. His service in World War I won him a CMG from the British Government, and he reached the rank of Colonel in 1920. Frank took his collection of snakes back to England when he retired, and donated it to the British Museum (Natural History). Throughout his career, Wall published on snakes; his (1921) *Ophidia Taprobanica* was the first treatment of Sri Lanka's snake fauna in a single work, since Günther's *Reptiles of British India* (1864). Wall was the discoverer of three new species of snakes in Sri Lanka, as well as several new records from the island of species that occur also in India. Most of his specimens lodged at the museum of the Bombay Natural History Society, however, have been lost (Das & Chaturvedi, 1998; K. Maduwage, pers. comm.).

Willey, A.

Born in Scarborough, England, on 9 October, 1867, Arthur Willey schooled initially at Kingswood, Bath, a Methodist school (his father bring a minister of that faith). His interest in natural history was stimulated when in 1887 he enrolled for a degree in natural sciences at University College, London, where he attended lectures by Edwin Ray Lankester (1847–1929). Lankester took Willey, an outstanding student, under his wing even before he graduated, sending him overseas to research the biology of lancelets, a group of primitive chordates commonly known as amphioxus, on the evolution of which, his PhD would later be based. After graduation, Willey obtained further exposure to marine biology in Naples and at the research station W. A. Herdman (*q.v.*) had established at Plymouth, following which he took up (from 1892–94) an assignment as a tutor in biology at Columbia University, New York.

In 1894 Willey obtained a studentship at Cambridge and was charged with researching the embryology of the pearly nautilus in the East Indies. Having proceeded to Jakarta, he obtained his first taste of the tropics before proceeding to New Britain in the Bismark Archipelago, the site of his study. In 1897 he returned to Cambridge with a sizeable collection, not just of species of nautilus but also a wealth of other marine organisms which he farmed out among other workers. Having published the *Zoological Results* (1895–97) of his expedition, from 1899–1901 Willey transferred to London, where he lectured on biology at Guy's Hospital Medical School.

Given his outstanding academic background, facility for independent field work, youth and interest in marine biology (at a time when the colonial government's attention was strongly focused on the resurrection of the pearl fishery: see pp. 28–29), Willey was perfectly qualified to be Director of the Colombo Museum. What is more, he knew and had worked with both W. A. Herdman (*q.v.*) and J. Hornell (*q.v.*), then influential in the appointment, being based in the museum for their researches on the pearl fishery. With the retirement in 1900 of the incumbent director, Amyrald Haly, the museum's first director, who had served since 1875, Willey accepted the job with much eagerness and began work in May, 1902, doubling as Government Marine Biologist.



Arthur Willey (1867–1942).

Willey worked tirelessly on the development of the museum. Recognizing that the only local vehicle for natural history publication was the *Journal of the Royal Asiatic Society (Ceylon Branch)* (in which his predecessor had published five papers—almost his entire scientific output—in the preceding quarter-century), in 1903 Willey launched the museum's own journal, *Spolia Zeylanica.* Noting the need for laboratories separate from the museum's display area, he also added new wings and

annexes to the sprawling building. Like Haly before him and Pearson (*q.v.*) after him, despite being a marine biologist, Willey strongly supported the development of the museum's ethnological and archaeological collections while more than doubling its natural history accessions during his eight years in office.

In Sri Lanka, Willey did not restrict himself only to marine researches. His 27 papers in *Spolia*, then issued quarterly, are divided among all groups of terrestrial vertebrates, with a handful of articles on insects and surprisingly few on marine organisms. In 1909 Willey resigned from the museum and accepted the headship of the department of zoology at McGill University in Montreal. He was to work there until his retirement, at 65, in 1932. In Canada, Willey was even more productive than he had been in his younger years. He worked intensively on the systematics of copepods, and in 1911 published an important text on evolutionary biology, *Convergence in evolution.* A committed Darwinist, in 1930 Willey wrote *Lectures on Darwinism*, drawing on a wealth of examples from his own experience to demonstrate the processes of evolution. He died on 26 December, 1942.

L. G. O. Woodhouse (1888–1965).

Woodhouse, L. G. O.

Lionel Gilbert Ollyett Woodhouse (22 February, 1888–31st March, 1965), Surveyor General of Sri Lanka from 1937–43, was the first lepidopterist to bring Sri Lanka's butterflies within the reach of amateur naturalists. His 1942 *The butterfly fauna of Ceylon*, presented in a single, comparatively compact volume, was far more accessible than Frederic Moore's (1880–87) three-volume treatise published a half-century earlier. The book also pioneered the technique known as 'nature printing', whereby the butterflies had their wing scales transferred on to gummed paper, from which the lithographic plates were made. The results were not, however, as satisfactory as the hand-colouring of Moore's plates or the colour printing technology available at the time; nevertheless, the book being comprehensive and economically priced, became a bestseller and ran into three editions. In 1952 Woodhouse presented his collection of Sri Lankan butterflies to the British Museum (Natural History), where the *ca* 4,000 specimens are still preserved (Harvey *et al.*, 1996). In his autobiography, Woodhouse's co-author, G. M. R. Henry (2000, *q.v.*), aspersed that the former Surveyor General was not a competent entomologist, and that much of his collection had in fact been made not by him, but by the regional staff of the Surveyor General's Department. The staff, however, were nowhere acknowledged

in the work, for which Henry provided the illustrations, with Woodhouse evidently diverting government resources available to him to produce his book during the austere years of World War II. Woodhouse in turn omitted Henry's name from the authorship in subsequent editions of the book. *The butterfly fauna of Ceylon*, however, served as the principal reference for the island's butterflies for a half-century, until d'Abrera's (1998) *The butterflies of Ceylon*.

Yerbury, J. W.

John William Yerbury (1847–1927) was a lieutenant-colonel in the Royal Artillery, stationed at Trincomalee. His collections of Diptera and Odonata are lodged in the Natural History Museum, London, the latter having been reported on by William Forsell Kirby (1844–1912) in his synthetic paper on Sri Lankan Odonata in the *Zoological Journal of the Linnean Society of London,* 1894, 24: 545–566, pl. 41, 42).

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