

Editorial

Readers will notice a change in the habitual order of the contents in this issue which has been made in response to comment that the library is Society News, not an addendum.

The Picture Quiz in the July issue (17:3) featured Samuel Stevens, Bates' and Wallace's agent. Fittingly, our January issue contains Henry Walter Bates' account of some of the more startling butterflies he and Wallace encountered in the Amazon basin and the methodology they employed for collecting in the rainforest. More importantly, Bates' work is amplified by illustrations of the original specimens from the NHM collections.

Meanwhile, Wallace had returned to the UK in order to make preparations for his next expedition to the Malayan archipelago and Stevens had communicated Bates' Nov. 1856 'Notes on an excursion from Eqa to Tunantins and Fonte Boa on the Upper Amazon' to the *Zoologist*:

"Ithomiae – they should be studied with very minute reference to their geographical site. In one district all the hundreds of individuals that occur of a species will, in nearly all the specimens, be exactly similar, and in another district a species so nearly allied that if found mingled with the other would be considered a variety, will be found equally constant through all the individuals examined. . . . I alighted on a charming dry hollow, quite alive with Ithomiae . . . comprising *I illinissa*, *aelia*, *cyrianassa*, *fluonia*, another common species, and four new species three of which are very interesting, being intermediates between *illinissa* and *aelia*. I captured a series of each, and found, notwithstanding their singularity close resemblance, that each species kept itself perfectly distinct . . . the idea of hybridity suggests itself almost irresistibly; but I have watched closely for proof of this, and have found none."

That same month in his letter of reply to Wallace (19 Nov. 1856) upon receiving his paper on 'The Laws which Governed the Introduction of New Species' he remarked:

"The theory I quite assent to, and, you know, was conceived by me also, but I profess that I could not have propounded it with so much force and completeness. . . . What a noble subject would be that of a monograph of a group of beings peculiar to one region but offering different species in each province of it – tracing the laws which connect together the modifications of forms and colour with local circumstances of a province or station – tracing as far as possible the actual affiliation of a species."

He then enumerates two such groups – the Heliconiidae and the Erotylidae. Wallace in answer (4 January, 1859) acknowledges Bates' contribution to the theory:

"Your collections and my own will furnish most valuable material to illustrate and prove the universal applicability of the hypothesis. The connection between the succession of affinities and the geographical distribution of a group, worked out species by species, has never yet been shown as we shall be able to show it."

However, by this time Bates was far less concerned with geographical distribution than with the problem of mimicry. In early 1858 (nearly six months before the epic Darwin-Wallace papers) he wrote to the *Zoologist*:

“three at least of the new species imitate three of the commonest – Ithomiæ of St. Paulo; on the wing their resemblance is much more striking than when in the cabinet. In fact I was quite unable to distinguish them on the wing; and always on capturing what I took for a *Ithomia*, and found in the net to be a *Leptalis* mimicking it; I could scarcely restrain an exclamation of surprise . . . The resemblance between Leptales and Ithomiæ two groups of Diurnes much more widely separated than they appear in our classifications is repeated in the case of a group of Bombycidae moths, of which there are at least two genera imitating the Ithomiæ and the larger Heliconiæ.”

Eventually the Darwin/Wallace theory provided Bates with an explanation for the extraordinary series of local species and varieties he had collected in Brazil while his concept of mimicry offered actual proof of the theory. Thus his first two papers to the Entomological Society (*Trans. Ent. Soc.* 1860:223; 335) dealt with the distribution of species, varieties and subspecies, while his third paper to The Linnean Society, ‘Contributions to an insect fauna of the Amazon Valley’, on November 21st, 1861 gave a description of the phenomenon of mimicry:

“The explanation of this seems to be quite clear on the theory of natural selection so recently expounded by Mr. Darwin . . . the selecting agents being insectivorous animals, which gradually destroy those sports or varieties which are not significantly like [the distasteful models viz *Ithomiæ*] to deceive them . . . I believe the origin of mimetic species offers a most beautiful proof of the truth of the theory of Natural Selection. It also shows that a new adaptation, or the formation of a new species, is not effected by great and sudden change, but by numerous small steps of natural variation and selection.” (*Trans. Linn. Soc.*, 23: 495-566, 1862)

When Darwin received Bates’ paper he wrote immediately to Hooker (18th November 1862):

“P.S. I am in middle of Bates’ paper; it is a very admirable & is worth labour (& that not slight) of careful reading – The remarks in the systematic part excellent on the formation of species from vars. – It is a pity the title did not more plainly tell contents. Most wonderful the mimetic resemblance’s!”

and then to Bates himself two days later (20th November 1862) congratulating him:

Dear Bates

I have just finished after several reads your Paper. In my opinion it is one of the most remarkable and admirable papers I ever read in my life. The mimetic cases are truly marvellous & you connect excellently a host of analogous facts. The illustrations are beautiful and seem very well chosen; . . . I rejoice that I passed over whole subject in the Origin, for I should have made a precious mess of it. You have most clearly stated and solved a wonderful problem. – Your paper is too good to be largely appreciated by the mob of naturalists without souls; but rely on it, that it will have *lasting* value, and I cordially congratulate you on your first great work. You will find, I should think, that Wallace will fully appreciate it. –

In 1863 Bates’ book *The Naturalist on the Amazons* was finally published. Darwin wrote to him in April 1863:

“My criticisms may be condensed into a single sentence, namely, that it is the best work of Natural History Travels ever published in England. Your style seems to me admirable.”

Then in the following year (1864) when the post of Assistant Secretary to the Royal Geographical Society became vacant and the choice was between Bates and Wallace, Darwin used his influence to have Bates appointed. Like Darwin, Wallace apparently considered Bates to be the better man for the job. Moreover, he disliked the idea of regular employment. In the event Bates made an excellent Secretary, a post he held for 27 years, until his death.

BRIAN GARDINER

The following item is printed here as a tribute to Professor W.T. Stearn Hon FLS who died recently.

**The Flying Mouse:
A Little Tale of East Anglia in Wartime**

W. T. Stearn (1911–2001)

(Written in R.A.F. Hospital near Rangoon, Burma. 29th August 1945¹)

The Rodent's Chronicle limits itself so exclusively to the affairs and doings of the obscure communities of Mickieland that extracts from it rarely, if ever, appear in newspapers of such fame and wide circulation as the Tavistock Gazette. Hence you are not likely to have read about the remarkable adventure of Mr. Mus-Longtail, although the March 1945 issue of an American magazine *Time* published a short paragraph relating to it out of the log-book of a radio operator aboard a "Flying Fortress" aircraft. This names no persons or places. The Roberts' Chronicle is, however, subject to less rigorous censorship, though its editors are known to possess Hanoverian cousins. It reveals that the hero was no less a mouse than Mr. Alexander Mus-Longtail of Great Nawing, whose family is well known for its association with Much Nibling. For security reasons these places are marked only on the special large-scale maps of East Anglia belonging to the British and German War Offices. You won't find them on the ordinary Ordnance Survey maps. They are, however, within easy distance of Mousehold Heath. I cannot vouch for the accuracy of all the details in the following account, because the Mickieland journalists learned their craft by listening under the floor-boards and in the skirting of famous editorial offices in Fleet Street and scrupulously follow its time-honoured customs and great traditions. The paragraph in *Time* is however, unimpeachably accurate, though unimaginatively brief. So much for authorities, sources and setting. Roger may be interested some day in the story. That's why I'm repeating it to you.

For many generations the Mus-Longtails had lived in the village shop of Great Nawing. The house was an old one, built in the prosperous days of East Anglian weaving by a merchant who saw to it that the beams were of well-seasoned oak and the whole building strong and roomy enough to serve as residence and store for his children's

¹ This is a transcript, edited only to correct obvious typing errors, of "Letter 117": typescript in Missouri Botanical Gardens Archives collection 23 series no 1/1, box 3 folder 22.

children when they too became wool-merchants. The house indeed outlasted the wool-trade. The village declined and historians and antiquarians alone remembered its former importance as an industrial and trading centre. Only ancient records testified to that. The half-timbered houses of the weavers and merchants became ordinary residences. Some fell into negligent hands and had to be pulled down. Others were converted into dwellings for several families and took on a slummy appearance. A few retained their dignity. The local doctor lived in one of these. He was very proud of its simple carved black woodwork and the pargetting of the outer wall but the owner of the village shop had equal reason for pride. Making his house into a shop necessitated a little alteration downstairs, but not much, for the house had been intended for trade before it became a simple residence and it now assumed something of its former function. The front room was fitted with a counter and scales and a bacon-cutting machine. Cupboards and shelves laden with a great variety of goods and foodstuffs hid the walls. Biscuit tins were stacked in a corner. Often there were sacks of potatoes as well, for the shop sold almost everything that anybody in the village was likely to need. A notice over the door said that the shopkeeper was licensed to sell tobacco and wines and spirits to be consumed off the premises. However he stocked much nicer things as well when I was a little boy. I say he', but as far as I can remember there was always an old lady behind the counter then. For a penny one could buy a piece of toffee, or some peppermints that were very, very hot, or aniseed balls, or little many-coloured confetti-like sugary sweets, or a sticky ball, on a stick, which we used to call a "gob-stopper". The place had a richness of smells. It was kept as clean as could be, but, of course, broken biscuits, flour, little scraps of bacon, cheese etc. would sometimes drop on to the brick floor and pass unnoticed at least by the shop-keeper. At night-time, when the doors were bolted and the people sat in the back of the house or upstairs, these scraps did not escape the attention of the Mus-Longtail family. Sometimes the old lady, taking a last look round, candle in hand, before she climbed the narrow stairs to bed, would surprise the Longtails at their foraging. She wasn't afraid of mice but she did not like them. "Drat the mice", she would say, "whatever do we keep a cat for? I must set a trap behind those tins tomorrow." Often as not she had forgotten all about it by next day.

Nevertheless the Mus-Longtails had to keep their eyes open and their noses keen. Tempting pieces of cheese often enticed the young mice onto wire contraptions which suddenly jumped and broke the mouse's back. The lazy old cat died and the young cat which took her place was a patient and cruel hunter. However she could not chase them further than the walls. If they escaped her first pounce, they usually managed to dart into a hole and were soon safe, though terribly frightened, within the elaborate labyrinth of narrow passages and tunnels which one generation after another of mice had patiently gnawed within the woodwork, plaster and thatch of the old house. This was their world, a world all of their own, and they could run from the front to the back of the house or from the shop up to the thatched roof without ever coming into the open. The people eating their supper often heard them scampering and squealing in the walls. So did the cat, but all she could do was to wait quietly near one of the many holes leading into that realm of safety. It was a pity they ever had to leave such a place and venture on to the dangerous floor or out into the poultry-yard at the back, though there was always

something to eat there. One day, however, the mice had a terrible shock. Although they lived in the country, they were house mice and they looked down on the field-mice outside as rather coarse rough crude-living creatures. However, the field-mice could have told them a thing or two. The field-mice knew all about weasels. On this occasion one of the Mus-Longtails was picking up grains of maize and wheat in the poultry-yard when a slender brown animal smelling of blood ran at him. The mouse had never seen or smelled this kind of animal before, and he certainly didn't like it. In fact he was terribly scared. He dashed for hole leading into the house, and when he reached it he would have been safe if the weasel had been a cat or a stoat. But being a weasel this blood-thirsty stranger was nearly as thin as he was and it followed him down the hole and into the house, right into those passages which had always seemed so peaceful and safe. Up and down and in and out they went. Then the mouse managed to squeeze into a passage too narrow even for the weasel. The weasel found the mouse-warren an attractive place. There were fresh mousey smells everywhere. It smacked its lips. Coming as a surprise it caught one mouse after another. It killed them for fun after it had finished killing them for food. The weasel is a sportsman in this respect at any rate. It ought, however, to have continued hunting mice and not have bothered about other game. The silly hens and chickens proved too easy to kill. The shop-keeper noted the neat way their blood had been sucked. A gamekeeper friend set a special trap and the weasel troubled the Mus-Longtails no more. They did not forget the terrible time they had had. When one of the baby-mice squealed too much or one of the bigger mice took food from the little mice, Mother Longtail would threaten to send for the big bad weasel, and they all knew what would happen then. At school they were taught to beware of weasels. The teachers and the teacher's teachers had none of them ever seen or smelled a weasel, but they had all heard how the wicked weasel had crept into paradise in Great-Great-Grandfather Mus-Longtail's day and had punished all the mice for the sins of the one mouse who had greedily ventured too far into the poultry-yard. Good house-mice should leave such vulgar goings-on to the field-mice.

So the years passed and, although the village changed little by little, the Mus-Longtails did not notice much change in their little world. Then food became scarcer and less varied. The poultry-yard ceased to yield grains of maize. No broken biscuits littered the floor of the shop. Cheese and bacon were sometimes to be smelled, but rarely indeed could the mice find any, and these tasty fragments usually baited traps. The mice had to be content with scraps of bread: they found the kitchen and the poultry-yard to be better foraging grounds than the shop and the pantry. Despite the big bad weasel they wandered further and further from the house and were sometimes well rewarded. One branch of the Mus-Longtail family grew prosperous in the pig-sty.

The Mus-Longtails did not pay much attention to the people who lived in their house, except to avoid them. If these people had talked in sensible squeaks and squeals, they and the Longtails might have devised a common language, and the Longtails would have learned the reason for the surprising lack of food in the former land of plenty. Words such as "rationing", "Germans", "Shipping", "black-market", "points", "Hitler", which often entered the people's conversations, meant absolutely nothing to the Mus-

Longtails. They simply became accustomed to scarcity. In the meantime the quiet village got noisier and noisier. Huge lorries continually rumbled through it and the old houses trembled. Then sudden roaring noises of deafening loudness would pass over the houses, sometimes by day, but most often at night. Young men in blue uniforms came into the shop but the Mus-Longtails did not notice this. They did notice, however, that more and more sacks of potatoes and carrots and other vegetables were put outside the shop, disappeared and were replaced. The shop-keeper had secured a contract to supply the officer's mess on the new airfield with vegetables. The mice played hide and seek with the cat among the sacks and more than once escaped by hiding inside them. In the days when Mr. Alexander Mus-Longtail had become the head of the family, another change took place. The young men in blue uniforms were replaced by young men in smooth brown uniforms. The shop-keeper did his best to supply them with spirits, if not wine, and the mice noticed a greater variety in the scraps given to the poultry. Sometimes these men dropped sugary wafers and oblong sweets into the floor and never bothered to pick them up. Mr. Alexander was the first mouse to sample these attractive gifts. He nibbled well into one and then a frightening thing began to happen. The sweets became sticky and elastic. The more he chewed, the more sticky and elastic they became. They stuck in his mouth and onto his whiskers. When he tried to pull the gummy stuff off with his paws, it stuck to them too. He had learned to recognize box-traps and back-breaker traps, but this was an altogether new kind of trap. Goodness knows how he managed, by wiping himself against the rough potato sacks, to get rid of that sticky mess! Luckily the cat was dosing. Sacks of vegetables continued to go up to the airfield. The sudden roaring noises now passed over the house by day, rarely by night. One day the cat chased Mr. Alexander into a sack of potatoes only a few minutes before this was picked up and dropped into a lorry. He was very bruised by the potatoes knocking against him and the noise frightened him, so he kept very very quiet and stayed where he was, thought the potatoes bumped up and down as the lorry took them to the officer's mess. Here they were lifted out again and, when all was quiet, Mr. Alexander crept from his hiding place and cautiously had a look round. Wonderful appetising smells came to his nose. There was no lack of food here. It was paradise for a hungry British mouse. Having no home Mr. Alexander went exploring that night. He had never wandered so much in his life before. He picked up plenty of food but always there were men moving about. Somehow or other he found his way into a motor-coach just outside the mess. It had lots of biscuit scraps on the floor and also some of those innocent-looking gum-sweets. He ate biscuits until he was sleepy, found a cosy place and went to sleep.

Later men came into the coach, laughing, talking, and the coach moved off. Mr. Alexander kept very still. Again he was frightened. The coach stopped; one of the men picked up the basket in which he had hidden and lifted it out and put it down inside another sort of coach. Other men climbed into this; they shut the doors and sat down, pulled helmets on to their heads and pushed buttons and twisted knobs and did all manner of strange things. Then the coach began to roar and shake. Never, never had the mouse felt such a shaking, heard such an enormous din. He did not know what to do. He jumped out of the basket and ran round and round. There was no way of escape. The noise became even louder. It was the same sort

of noise as used suddenly to pass over the old house. That often frightened the people in the house when it sounded only a foot or two above the chimney-stack, but the strange men here paid no attention to it. They were so busy, they didn't chase the mouse or even seem to notice him. Then the coach rushed forward, like an angry monster, and lifted itself off the ground. One of the men saw the mouse. He fumbled in his flying jacket and then dropped a piece of biscuit and, when Mr. Alexander cautiously nosed this and then began to nibble, the man did not try to catch the mouse, but watched, then wrote in his log-book: "10.15 hours, zero, noticed mouse".

Later he made another entry: "11.50 house, 10,000 feet crew taking oxygen, mouse O.K." Mr. Alexander did not know where they were. As far as he was concerned, they might have been on the ground in Great Nawing, now many, many miles away. He did not know he was even higher in the sky than the noisy rooks who had their nests in the tallest elm trees in the village. But he began to feel very, very tired and sleepy. He went to sleep on the floor where he was. Then a gloved hand picked him up and put him in a warm soft cosy furry place: he stirred uneasily, then went to sleep again. The man's log-book recorded: "13.10 hours, 22,000 feet, mouse cold, put in heated muff, drowsy." Another entry later said: "13.25 hours, 25,000 feet, mouse unconscious fleas active, target bombed."

Exciting things happened but Mr. Alexander knew nothing about them. The men became feverishly active. Bangs and other noises added to the roaring din. Swift spinning pieces of metal tore through the metal of the plane. A fire started but the men quenched it. Mr. Alexander dozed on, as peaceful as in the thatch of the old house. The man made other entries in his log-book. By and by one read: "15.10 hours, 20,000 feet, mouse stirring." Late he wrote: "16.00 hours, 10,000 feet, mouse running around." Mr. Alexander had now become his normal self. He kept looking for a hole which would lead out of this shaking noisy place. Then it bumped up and down and came to a standstill. A man opened a door and chased Mr. Alexander through it. The log-book's last entry said: "16.30 hours, alt. zero."

Mr. Alexander fell into a wilderness of grass. Then he smelled a familiar welcoming smell. It came from a pile of potato-sacks. He crept into them and out of sight, but he did not remain undisturbed, for soon a lorry came by, some-one picked up the sacks and threw them into it. Mr. Alexander along with them, and they bumped along a rough road. Then the lorry stopped and the sacks were thrown out of it. Poor Mr. Alexander, bruised and frightened, decided that sacks were unlucky hiding-places. He dashed out, a cat gave chase, but then a familiar hole caught his eye. In he went. All around were nice homely mousey smells. He was back in the old house at Great Nawing. Opinions differ among mice of wisdom and knowledge as to the accuracy of Mr. Alexander Mus-Longtail's account of his adventures. That he went as near as he did to the terrible roaring noise is quite possible, but that he found a place so abounding in food is contrary to all recent experience. Certainly bold explorer mice have gone in search; nobody, however, knows whether they have fallen victims to cats, stoats, weasels, owls, kestrels or traps or have

reached at last the paradise of mice and Servicemen, a store of American rations, for they have never returned. Moreover the Americans and the Flying Fortresses have left Great Nawing. The old house remains, the admiration of tourists, and the Mus-Longtails still inhabit its walls, ceilings, and thatch. Sit quiet of an evening and amid the creaking that is the language of an old timber-built house you will hear their scampering and squealing and you may see, if you sit quiet long enough, the sharp whiskered nose and beady eyes of Mr. Mus-Longtail himself peering from a hole in the skirting.

Society News

Just a year ago, the Society arranged with the parishioners of St. Katherine's, Merstham, Surrey, to plant a ginkgo tree in the churchyard in memory of the Society's benefactor, Mr. BE Smythies Hon. FLS. The Executive Secretary wielded a suitable implement to mark the occasion. In late September 2001, the parish dedicated a bronze plaque provided by the Society at the base of the tree, which stated simply "Bertram Evelyn Smythies (1912–1999). Naturalist and Christian Gentleman".

Some of the most embarrassing matters we deal with in the office are journals and documents sent to deceased Members, mostly in ignorance. It would be helpful if those who mail Society Members (Specialist Groups, Committee membership, etc.) would check the Annual Report each year where deceased Members in the year in question are now listed.

The Scottish trip in September was called off through lack of support. Our colleagues in the International Dendrological Society were visiting a couple of the sites at the same time, and we had arranged to share with the IDS a reception, which our President, a resident of Edinburgh, had kindly agreed to give at his house, and a dinner the following evening in the University. Probably we would have done better to have hired a minibus to take participants around in – this is what the IDS did. The President reported that the reception went well in the Society's absence (actually there were a few FLS's there). There have been strong representations to do something at the National Botanic Gardens of Scotland, so watch this space.

The same fate, for other reasons, befell the meeting Chitral valley: report of the 1999 expedition, which was to have been held in Peshawar, Pakistan. We must hope for better things in the not-too-distant future.

The first presentation in the Society's rooms in the 2001–2002 session was part of a joint meeting with the British Society for Parasitology entitled *The molecular ecology and epidemiology of parasites*. The Society has heard from a number of parasitologists in the past; as they discover more of the metabolic ingenuity of their chosen subjects, it is clear that strategies for antiparasite therapy need to be as sophisticated as their targets. Sadly, this seems something of a forlorn hope at present. Despite so much elegant science, most antiparasitic drugs have been discovered by serendipity and none recently.

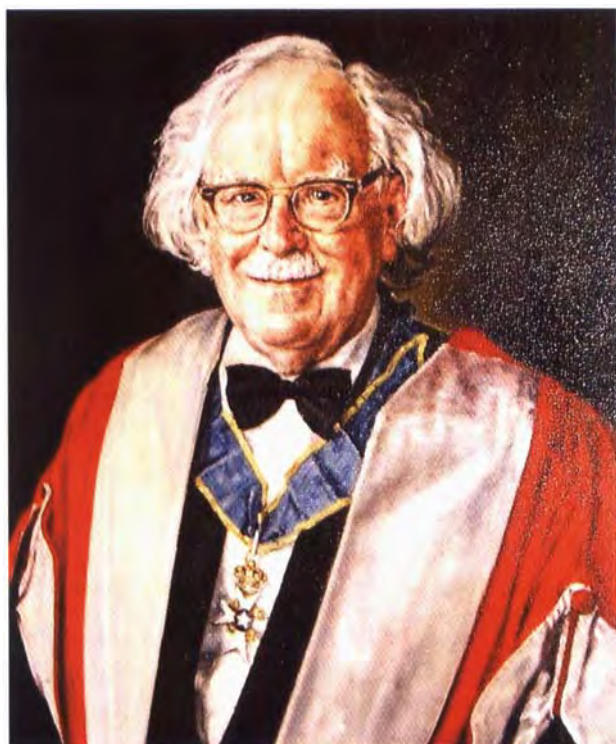
The meeting was noteworthy in that it featured nine presentations, all using Powerpoint and the Society's videoprojector, which is essentially an additional computer screen. Speakers were warned to bring their own laptop computers and to make sure that they knew how to operate them for this purpose. Few did; some brought their own CD-ROMs, others floppy disks. The latter have limited capacity but were no problem with the laptops available that day. The CD-ROMs caused difficulties. Eventually, and with the help of our friends in the Royal Astronomical Society and a kind visitor who collected a new laptop from her hotel and allowed us to reprogramme it, we discovered that rewritable (CD-RW) CD-ROMs will not work properly unless they are read by computers having the software installed compatible with that used to write the RW disk. It actually says so in the instructions for their use, which we imagine are not considered required reading! Single-use CD-ROMs (CD-R) on the other hand can be read by any computer, regardless.

We reiterate our warning to bring your own laptop for such presentations; for those travelling by air this is increasingly difficult. In fact, all the CD-ROMs, designed for PCs, seemed to run well on an AppleMac laptop. There's a lesson there somewhere.

Information concerning the Society's publications will be with Members shortly. The original purpose of asking for other bids for jointly publishing our scientific journals and *The Linnean* was to satisfy ourselves and the Charity Commissioners, should they ask, that the financial returns from the publications were reasonable, bearing in mind that those returns provide the Society with nearly half its income. Nine publishers put themselves forward; four were interviewed over a two-day period last March. In the period during which these matters were under discussion, our then publishers were taken over and what had looked a relatively routine as-you-were turned into a very open race. The Officers and the one Editor present decided to recommend awarding the contract to Blackwells and we are looking forward to working with them. None of this detracts from the 36 years of support we have enjoyed from Academic Press. We are indebted to Charles Hutt, whose 90th birthday it is on 1st January 2002, and who set up the original contract way back in 1965, and the various members of AP's staff who have dealt with the Society's affairs, most recently Mrs. Pam Delaney, Mr. Jonathan Lewis, Dr. Andrew Richford and Mrs. Bina Sharma. We wish them every success in the future.

On the Society's side, the brunt of the negotiations has been borne by the Editorial Secretary, Professor David Cutler. To him has fallen the tasks of setting up suitable tendering documents and criteria for comparing those interested in publishing the Society's journals. Once a new publisher had been chosen, his was the task to effect a smooth transition from our former publisher to the new. Throughout all this there was a climate of helpfulness on all sides – due in no small part to David's diplomatic skills – which has been much to the advantage of the Society. The Society owes all those involved a considerable debt for all that has been achieved, and we are confident that our Members will reap the benefits.

In the past thirteen years, the Society's publications have undergone radical transformation. From the severe covers of the three scientific Journals and the positively



Professor W.T. Stearn FLS (1911–2001)

funereal aspect of this Newsletter, we have moved through elegant cover designs to electronic publishing, now seen as the way ahead. *The Linnean* is now available free on the Internet and Fellows are able to access the electronic versions of the three scientific Journals for a mere bagatelle. Electronic publication on demand will be the next step, where articles, refereed and edited, will appear on the Internet as soon as they are ready for publication. The electronic versions will almost certainly be made available free to institutions in the Third World. *Tempora mutantur, nos et mutamur in illis*. Even Darwin would have agreed with that!

Whilst on the latin theme, the death in late September 2001 of Anna Bidder Hon. FLS has removed a formidable figure from the marine invertebrate scene (obit *Daily Telegraph*, 04.10.01). She became a Fellow of the Society in December 1928, and a Fellow *Honoris causa* in 1991. Such eminence demands a latin certificate signed by all the Officers under the Society's weighty seal which, since the Stock Exchange became electronic, is now its sole use. Dr. Bidder's certificate was duly dispatched; some while later a third party relayed a message to the Executive Secretary that, in Dr. Bidder's opinion, the certificate was male chauvinistic dog latin. Here it is:

SOCIETAS LINNAEANA LONDINENSIS

Cum SOCIETAS LINNEANA suffragiis latis virum doctum optime in augenda scientia meritum Dominum

Mus Mickius

inter socios illos esse voluerit, quos [honoris causa] adsciscat, jussu et nomine societatis nostrae testamur nos illum rite electum esse. Cujus rei in testimonium dato diplomate, chirographa nostra inscripsimus, et insuper sigillum addimus societatis nostrae.*

*or [*e peregrinis*] for FMLS

Classical scholars are welcome to provide something more in tune with our equally opportunistic age. And who drew up the offending citation? *De mortuis, nil nisi bonum*. Professor WT Stearn Hon FLS.

On a rather different tack, fair wear and tear does take its toll of the Library's books. We have been fortunate in securing the freelance services of Janet Ashdown to restore some of the affected tomes. Janet trained at the Camberwell School of Art and Design and in her final year worked in our Library to gain experience. Janet works in one of the basement rooms and is prepared to offer her services to Members who may want books restored.

JOHN MARSDEN

Library

During the Librarian's brief absence (3½ days) at the end of September, workmen were given the go-ahead to begin work in the portion of the basement beneath the Geological Society, where part of the Linnean Society journals are stored. Fire regulations now require us to move some material stored along walls of corridors which are fire exits. Additional wall space to accommodate material we have to move has been gained by removal of a defunct staircase and some doors made obsolete by new partitions. In order to start work there was wholesale removal of large quantities of books and journals before anyone advised on how it should be done. The resulting piles of journals now effectively block access to some other stores. Remaining material is now being moved so lino can be laid. It will take some months for occasional student helpers to restore order to chaos. Priority will be given to moving bookcases blocking doorways so we can at least try to find what is needed.

As we will be moving steel shelves we have to empty them first, and that means finding "empty space" in an already overfull basement!

The book sale has so far added over £350 to the Library funds as well as a number of older items to fill gaps in our holdings. In some cases we do not know the source of these donations, which appeared in the book lift labelled "for the book sale". If you recognise your book on display at some future date please tell us and we can put the record straight. Dr Brian Hopkins took advantage of the *Conversazione* to deliver a number of boxes of journals and similar material for both the Library and the book sale but these are not listed, nor are major additions of freshwater biology books from the late Dr Annie Duncan, presented by Mary Burgis.

Donations

The following donations were received during September and October, a few arrived earlier and were missed from previous lists. Some are books extracted from items brought in for the book sale and a few are older donations or bequests which are only now being processed. Just before completing this listing, the Library was presented with a copy of the 5th Edition of Miller's *Gardener's Dictionary*, 1741, thanks to the good offices of Colin Bowlt who suggested to the donor, listed below, that we might be a suitable home for her godmother's book. It needs some repair but, once this is done, will be a useful addition to our rich historical collections.

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|--------------------------|---|
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GINA DOUGLAS

Picture Quiz

The October Picture Quiz 17(4) 13 featured Nathaniel Bagshaw Ward (1791–1868). The son of Mr Stephen Ward, a medical practitioner of great repute in the East-end of London, he was born in Whitechapel in 1791.

Destined for the medical profession, Nathaniel trained at the London Hospital from whence he attended Mr Wheeler's lectures in Botany at the Chelsea Physic Garden and with whom he went on frequent herborizings to such places as Wimbledon Common and Shooter's Hill. Eventually, when his training was completed, he took over his father's practice which he is said to have performed with "exemplary assiduity." (*Proc. Linn. Soc.* 1868–69: CXII)

His initial love for natural history (and travel) was fostered by his father who sent his son, aged 13, on a voyage to Jamaica where the superb tropical vegetation, particularly

the palms and ferns, so enchanted him that he became an ardent and devoted botanist. Then, on returning home, his father apprenticed him to the medical profession.

Living and working in the smokey atmosphere of the East-End made it very difficult to not only cultivate and rear plants but also to maintain their freshness and verdure. However, Mr Ward was to have his difficulties removed. In the summer of 1829 he had placed the chrysalis of a moth in some mould in a glass bottle covered with a lid – in order to obtain a perfect imago. To his surprise not only did the moth emerge but in his jar had grown both grasses and ferns. On reflection he realised that not only had his jar maintained the necessary conditions for the life of the plants, such as air, light and moisture but also, more importantly, the deleterious influence of a smoky atmosphere had been excluded. This then was the origin of the Wardian case.



In 1836 Ward wrote to W. Hooker announcing his discovery; and Hooker sent on the letter to the *Companion for the Botanical Magazine* where it was published in May of that year (pp. 317–320). In 1838, Faraday lectured upon the subject to a large audience at the Royal Institution and in 1842 Ward finally published his work entitled: *On the Growth of Plants in Closely Glazed Cases*. Subsequently he established the vivarium as a modification of the initial Wardian case.

In 1833 he sent two cases of growing grasses and ferns to Sydney, where they were refilled with Australian plants, their contents reaching England alive without having been watered and having been exposed to temperatures of 120°F at the equator and to snow off the Cape Horn. Eventually they were commercially propagated by Messers Loddiges in 1834.

In the Linnean Society obituary of Ward it said, in reference to the importance of the Wardian case, that many years ago Mr Williams the missionary established the banana in one of the Navigator Islands where it was previously unknown. This caused Seeman (see *The Linnean* 16(2):6-12) to write to the editor pointing out that the banana already existed there in superabundance – and that it would be like taking coals to Newcastle or Owls to Athens. Whereas, what William's really did, and where Ward's contrivance came in for its full share of glory, was the introduction of the Chinese or Cavendish Banana, which was previously unknown there. Adding that John Williams, better known as the Martyr of Eromagna, had brought them in a Wardian Case from the Duke of Devonshire's seat at Chatsworth to the Samoan or Navigator Islands, whence again, in 1840, the Rev. George Prichard carried it to the Tongan or Friendly Islands as well as to Fiji!



Clue: The first person to recognise the importance of Foraminifera in stratigraphical geology.

The East India Company soon realised the potential of Ward's innovation and in 1843 sent Mr Fortune out to China to collect tea plants. Fortune was an assiduous collector who eventually successfully conveyed some 20,000 plants from Shanghai to the Himalayas by means of Wardian cases. Meanwhile, the supplies of Fever Bark or Cinchona (from which quinine was extracted) were becoming exhausted (in 1848 four thousand quintals of Calisaya bark was exported from Bolivia alone). The East India Company having now realised the importance of the Wardian case selected one of its junior clerks, Mr Clements Robert Markham (FLS 1864–81) on account of his knowledge of the country to be visited and of the language of the native Indians, to go to Peru to bring back Cinchona plants. In 1850 Markham collected 529 Cinchona plants, comprising both large rooted plants and seedlings, chiefly Calisagas. These were subsequently packed into 15 Wardian Cases, for India via Southampton, to be established in the Nilgiri Hills.

By means of Wardian cases not only was tea and quinine introduced into India but also, according to the testimony of William Hooker, so too were most valuable plants

introduced into Kew Gardens. Eventually Ward gave evidence before a Select Committee of the House of Commons where the window-tax was under consideration and thereby effected its removal.

Throughout much of his life Ward was associated with the Chelsea Physic Garden, first as Master and then as Treasurer. In 1863 he arranged the transfer of the Ray, Dale and Rand herbaria from Chelsea to the safer custody of the British Museum. He was an original member of the Botanical Society of Edinburgh and acted as its local London Secretary for many years. In this capacity he had close contact with two of his East-End neighbours, Edwin and John Quekett, with whom he founded The Microscopical Society in 1839. In this connection it is worth noting that Ward observed and reported to the Microscopical Society that "the muscular fibres of the whale are no larger than those of the bee." As Wallace commented to Darwin (2 August 1862):

"An excellent indication of community of origin."

On retirement Ward moved to Clapham Rise, devoting himself to gardening. He died at St. Leonard's, Sussex on 4 June 1868 and was buried in Norwood Cemetery.

Ward was elected a Fellow of the Linnean Society in 1852 and was present at the 1858 reading of the Darwin/Wallace paper. His portrait was painted by J.P. Knight as a consequence of Fellow's subscriptions (like that of Darwin). He is commemorated in *Wardia* a genus of South African mosses.

He was a genial companion, full of anecdotes, which according to his biographer he related with much felicity; always cheerful he imparted this cheerfulness to those with whom he came in contact. Despite listening to the Darwin/Wallace paper and reading, the *Origin of Species* he remained a quiet and practicing Christian.

BRIAN GARDINER

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Correspondence

22 August 2001

duyker@value.com.au

Dear Prof. Gardiner,

I was very pleased to read your article on Daniel Solander in the July 2001 issue of *The Linnean*, but feel I must alert you to an error with regard to the recent joint stamp

issued by Australia and Sweden. The stamps were indeed designed by Melinda Coombes of Melbourne and it was intended that Czeslaw Slania would engrave them, but Slania fell ill and was only able to engrave the Australian stamps. The Swedish stamps were, in fact, engraved by Lars Sjooblom. It is certainly unusual for a joint stamp issue to have the same designer, but two different engravers.

Solander's middle name was not Carl. He was christened simply O E Daniel Solander, but when he began his studies at Uppsala he adopted the name Daniel O E Carlsson Solander to distinguish himself from his uncle, also named Daniel Solander, who was a Professor of Law.

Yours sincerely
EDWARD DUYKER

1 August 2001

3 Myrtle Close, Dousland,
Yelverton, Devon PL20 6NZ

Dear Brian

Many thanks for Part 2 of 'Best Laid Schemes...' and for incorporating the Introduction. The photograph and signature of W.H. Lang is a valued addition. The only photographs available at Glasgow are of a much younger early 1900s vintage, with a much younger Lang already bearded. The students described him as 'looking like an apostle'. I note the loaded pipe in his hand. He and Gwynne-Vaughan were inveterate pipe smokers, as was also R. Kidston. The atmosphere in Kidston's 'study-cum-laboratory' in 12 Clarendon Place, Stirling must have become pretty thick with two pipes going full blast! See *The Linnean* 1994 vol.10(1) p.43, with G.V. and Kidston. After G.V's death in 1915 Lang took his place, so guaranteeing a continuation of the dual smoke output.

With best wishes, Yours sincerely
DONALD BONEY

From the Archives

The Rudbecks' great work *Campus Elysii* compiled by father and son was intended as a survey of all known plants and was illustrated with some 3,200 woodcuts. Sadly most of the woodblocks, and Rudbeck Olof the younger's copious notes that went with them, were lost in the disastrous fire of 1702 which destroyed three-quarters of Uppsala. All that remained of *Campus Elysii* were two copies of volume 1 and 19 of volume 2.

Through Dr Acrel, James Smith learned that the Linnean Collection contained a very rare book, the second volume of Rudbeck's *Campus Elysii* for which he knew Banks would offer at least £100! What he did not realise till later was that he had also acquired the original 35 woodblocks which the Rudbecks had pulled from the fire. It is,



Rudbeckia lacinata

of course, of great interest how they had been acquired by Linnaeus. The University Botanic Garden had initially been laid out in 1655 by Rudbeck the elder, who also built a Professor's Residence in its south corner. This residence was one of the few buildings to have escaped damage in the great fire. Eventually his son, Olof the younger, succeeded him (1702). Meanwhile, in 1729, Linnaeus was befriended by Olof Celsius who subsequently showed his protégé's thesis *Praeludia Sponsaliorum Plantarum* to Rudbeck. Linnaeus at that time was a second year medical student who, according to Stearn, had applied for the post of gardener in Rudbeck's Botanic Garden. However, instead of gardener, Rudbeck offered Linnaeus the position of Botanical Demonstrator (1730), a position he apparently still held when he was appointed Professor of Medicine at Uppsala in 1741. Rudbeck's patronage did not finish there, for he arranged for Linnaeus to tutor his three botanist sons, housed him in his own house and then arranged for a Senate Grant towards his support.

Linnaeus showed his gratitude to Rudbeck by naming an American plant in his honour:

"I have chosen a noble plant in order to recall your merits and the services you have rendered, a tall one to give an idea of your stature; and I wanted it to be one which branched and which flowered and fruited freely, to show that you cultivated not only the sciences but also the humanities. Its rayed flowers will bear witness that you shone among savants like the sun among the stars; its perennial roots will remind us that each year sees you live again through new works. Pride of our gardens, the Rudbeckia will be cultivated throughout Europe and in distant lands where your revered name must long have been known. Accept this plant, not for what it is but for what it will become when it bears your name. . . ."

Olof Rudbeck was, however, more concerned with his Thesaurus than with his plants, and consequently the initial 1,800 plants cultivated in 1685 had by 1741 dwindled to less than 300.

Following Rudbeck's death (1740) and Linnaeus' appointment as Professor in 1741 the supervision of the Botanic Garden was assigned to Linnaeus. However, he did not move into the professorial residence in the Garden until 1743 commenting that it was in such a state of disrepair that it looked: "more like an owl's nest or a den of thieves than a professorial residence." There seems little doubt that the woodblocks pulled from the fire by the Rudbeck's had remained in the Professor's residence.

Thus Smith had acquired not only a copy of the second volume of *Campus Elysii* but also all the woodblocks used in its publication. Eventually he arranged for these blocks to be printed, providing Linnean determinations and dedicating the work to Johan Arel in an edition of 12 copies which he gave away to his friends and correspondents.

Rudbeck (O.) Reliquiae Rudbeckiana, sive camporum elysiorum libri primi . . . Upsaliae anno 1702 editi, quae supersunt adjectis nominibus Linnaeanis. Accedunt aliae quaedam icones caeteris voluminibus...cura Jacobi Eduardi Smith

BATES, and the Beauty of Butterflies

Kim Goodger and Phillip Ackery
The Natural History Museum, London

ABSTRACT

An up-dated version of Henry Walter Bates' account of some of the most startling butterflies to be encountered in the Amazon basin is given, supported by extensive cross-referencing to more contemporary studies of butterfly biology and classification. Bates' work is further amplified by details and illustrations of his original specimens as abstracted from the collections of The Natural History Museum.

INTRODUCTION

In any major systematic institution, it is the fate of individual donations to be assimilated within the 'Main Series', not least because this enhances the collection as the prime data source for taxonomic study. Clearly, from the historical perspective this results in some information loss. But it need not be lost for ever. Individual collections can be reconstructed as long as each specimen bears a unique collection marker, although this is a time-consuming exercise not to be undertaken lightly. As those of us attached to the butterfly collection at The Natural History Museum (BMNH) are asked repeatedly for access to material collected by Alfred Russel Wallace and Henry Walter Bates, we made a conscious decision to satisfy an apparent genuine need, starting with Bates' butterflies collected along the Amazon. This material, was documented by Bates in a series of articles under the running title *Contributions to an Insect Fauna of the Amazon Valley* (Bates, 1860; 1861a, b [covering Papilionidae]; 1862a, b [Nymphalidae – Danainae, Ithomiinae, Heliconiinae in part]; 1864 [Nymphalidae – introductory text and Heliconiinae in part, Nymphalinae, Biblidinae in part]; 1865 [Nymphalidae – Biblidinae in part, Apaturinae, Charaxinae, Morphinae]).

Given the need for something diverse and visually startling we settled upon the subset of the Nymphalidae covered by Bates in his 1864 article and located Bates' material for all 73 species as originally listed. And as part of this work we rediscovered the joy of again reading Bates' colourful and original observations on the Amazonian butterflies. While his 'words' are certainly still accessible to those who know of his work, we had the additional pleasure of handling his material which was the stimulus for the present article – a desire to share with a wider audience something of our delight with Bates' original text and his specimens.

So, we have endeavoured to present an updated, fully-illustrated version of the 1864 paper, hopefully even enhancing the spirit of the original. To achieve this we have taken the liberty of imposing several changes, up-dating the nomenclature, and presenting the data in a modern systematic framework, essentially that proposed by Harvey (1991). This in many ways supersedes all Bates' discussion on classification, which is now

deleted (but it is a measure of Bates' insight that the order of species is hardly changed at all). We pick up Bates' text with his general behavioural observations, before moving on to his species-by-species accounts. Within the generic introductions we include, by means of footnotes, references to the standard generic monograph where available. Each species is introduced by a central heading, the current combination; Bates' original headings are moved to the margin immediately below the central epithet. We then have Bates' colourful observations and can do no better than quoting Moon (1976) – "these bring alive and render comprehensible the glorious butterfly that would otherwise lie hidden beneath the words of its formal description. It is as if Bates catches once again the beauties of the great river". There then follow details of the larval hostplants where known to us (from Beccaloni *et al.*, in prep.), together with citations of articles referring to early stage biology. Full details of the Bates specimens that we have abstracted conclude each species entry, but with two qualifications. Because of the extensive duplication of the suite of labels attached to many specimens the label data is to some extent interpretative and selective rather than verbatim, and the type status where applicable is according to the labelling attached – we have not verified this against original descriptions. Throughout, our text is cross-referenced to the six plates which illustrate Bates' specimens for a selection of species covered in the text. So, we hope that the essence and eloquence of Bates is still retained within a text that now provides a contemporary information source for a small sub-set of Amazonian butterflies.

BATES THE BUTTERFLY COLLECTOR

Here we seek simply to illustrate Bates as a collector, emphasising his relationship with the [now] Natural History Museum with particular reference to the fate of his collections. For those wanting more, then obviously *A Naturalist on the River Amazons* would be the well-known primary source, but we especially acknowledge H.P. Moon's lesser known booklet (1976) *Henry Walter Bates F.R.S. 1825–1892 Explorer, Scientist and Darwinian* as the source of many of the quotations given below, and G. Woodcock's *Henry Walter Bates. Naturalist of the Amazons* (1969).

Henry Walter Bates worked as a naturalist along the Amazon River for eleven years, from 1848 until 1859. Initially he was accompanied by Alfred Russel Wallace who indeed appears to have first proposed the expedition – "In the autumn of 1847 Mr A.R. Wallace who has since acquired wide fame in connection with the Darwinian theory of Natural selection, proposed to me a joint expedition to the river Amazons, for the purpose of exploring the Natural History of its banks, the plan being to make for ourselves a collection of objects, dispose of the duplicates in London to pay expenses, and gather facts, as Mr Wallace expressed in one of his letters 'towards solving the problem of the origin of species', a subject on which we had conversed and corresponded much together" (Bates, 1863). But in 1848, they went their separate ways, ultimately with Wallace ascending the Rio Negro and Bates travelling deep into the Upper Amazon. With primary bases at Pará (present day Belém), Santarém and Ega (present day Teffe), Bates roamed widely, as far west as São Paulo de Olivença.

Bates' collecting day appears to have been methodical. He writes from Ega to his brother Frederick,

“between nine and ten am., I prepare for the woods; a coloured shirt, a pair of trousers, pair of common boots, and an old felt hat are all my clothing: over my left shoulder slings my double barrelled shotgun, loaded, one with No.10 shot, one with No.4 shot. In my right hand I take my net, on my left side is suspended a leather bag with two pockets, one for my insect box, the other for powder and two sorts of shot; on my right side hangs my ‘game bag’ – an ornamental affair with red leather trappings and thongs to hang lizards, snakes, frogs or large birds; one small pocket in this bag contains my caps, another papers for wrapping up the delicate birds, others for wads, cotton, box of powdered plaster, and a box with damp cork for micro-lepidoptera, to my shirt is pinned my pin cushion with six sizes of pins. A few minutes after entering the edge of the forest I arrive at the heart of the wilderness – before me nothing but forest for hundreds of miles. Many butterflies are found on the skirts of forest. In the midst of a number flitting about I soon distinguish the one I want..... I walk about a mile straight ahead lingering in rich spots, and diverging often. It is generally near two pm. when I reach home, thoroughly tired. I get dinner, lay in hammock a while reading, then commence preparing my captures etc: this generally takes me to five pm.: in the evening I take tea, write and read, but generally in bed by nine” (Bates, 1857: 5659).

Scavengers and dampness are the scourge of tropical butterfly collecting and Bates developed his own methods of dealing with them. In his study room at Ega

“cages for drying specimens were suspended from the rafters by cords well anointed, to prevent ants from descending, with a bitter vegetable oil: rats and mice were kept from them by inverted *cuyas*, placed half-way down the cords” (Bates, 1863).

To this could be added the perils of transport. Wallace’s disaster returning on the *Helen* is widely documented (Bates, 1853e: 4114, comments “had it been my case, I think I should have gone desperate, because, so far as regards the unique specimens, the journal &c., such a loss is irreparable”). Bates too had his disasters – “As to my private collection, I find it impossible to ascertain correctly what specimens I lost in the “Mischief” (Bates, 1852:3322) and “I am very sorry to hear of the damage done to my collection at the Custom-house; that was the best box, and, in fact, I think, the very best box of butterflies I have ever sent: no one knows the days and weeks of patient search that collection cost me”. It was almost certainly with these dangers in mind that Bates arranged for his final collections to be divided into three lots, each lot returning to England by separate ship (Bates, 1863). While the transport of material between Brazil and London was clearly hazardous, it could be accomplished remarkably quickly. Writing from Santarém on the 12th April, 1852, Bates expresses the expectation to his London agent, Samuel Stevens, that a consignment sent seven weeks previously “will I hope, be at hand by this time” (Bates, 1853a: 3726). But the upper Amazon was a different matter – for sailing vessels, a round trip from São Paulo de Olivença to Pará might entail a seven-month voyage (Bates, 1863).

Bates was a prodigious collector – it is widely estimated that he collected more than 14,000 different insect species, 8,000 of them previously unknown. Later he stumbled upon the incredulity that such figures caused –

“On Monday morning I fell into a nest of hornets at the British Museum, in the shape of a knot of the leading curators (Dr Gray at the head) criticising fiercely my statement of having found 8,000 new species”.

Upon recounting this incident to J.D. Hooker, he received a most perceptive reply

“Above all things remember that entomologists are a poor set, and it behoves you to remember this in dealing with them. It is their misfortune not their fault; deal kindly with them[!]”.

The relationship between Bates and the then British Museum was quite ambivalent. Prior to setting out on their expedition, Bates and Wallace certainly had access to the BM collections – Wallace (1905) records their meeting in London toward the end of March, 1848, “to [among other things] study the collections at the British Museum”. Later, Bates records his unflattering observations upon the collection which were

“in the utmost confusion; scarcely a genus in proper order and duly named. No entomologist who wishes to name his species can do anything with it, and it is of very little aid to any one wishing to work out any scientific problem in which insects supply the facts” (Clodd, 1892).

The B.M. system of labelling though did find some favour –

“how excellent is the system adopted by the British Museum which tickets every individual specimen (at least in the Lepidoptera), and comprises specimens of each species from different points of its area of distribution (Bates, 1858: 6169).

Bates, like Wallace, financed his work by selling material through Stevens. A few entries in the BMNH collection register indicate the sums of money involved – for instance, entry BM.1851-43 – 55 Lepidoptera at 3/- (15p), 70 at 2/6d (12.5p), and 31 at 1/6d (7.5p). And the Museum clearly had first option, much to the chagrin of W.C. Hewitson, himself an eminent lepidopterist – “I see nothing of your choice things they are all picked out by the museum people” and “They swallow up 2 or 3 of one species and one gets none”. But Hewitson’s priorities were very different from Bates’ – the former was perhaps more a man of his times, mainly interested simply in illustrating ‘novelty’; it seems he had little empathy with Bates’ insistence upon accurate locality data. Perhaps this was an additional source of friction between them provoking Hewitson’s obviously offended responses to Bates – “I thought your attacks upon me very unfair” and “Your accusations of carelessness were very unfounded my whole mind being anxiously in the book”. And they were philosophically poles apart. Hewitson declares “if [I] could believe in the transmutation of species or if there was one grain of truth in the chaotic jumble of Mr. Darwin, [my] life-long pleasure and occupation would be taken from [me]” (Hewitson, [1857] in Hewitson, [1852–76]).

We remain intrigued by two outstanding problems regarding Bates’ butterflies – to what extent did he prepare the material, and how was it safely stored during transport? It is clear that in later life Bates’ preference was for papering butterflies in the field. In Freshfield & Warton’s *Hints for travellers.....* (1889) he recommends “a supply of triangular paper envelopes for Lepidoptera” and even earlier refers to a collection of his own being already papered prior to dispatch (Bates. 1853a: 3727), but “papered”

need not have the lepidopterological connotations that it has today. Certainly, in the description that has come down to us of Bates in the field (see above) there is no mention of paper envelopes amongst his equipment, just paper for wrapping birds.

With this in mind, we examined Bates' material more closely. The specimens that he collected were probably divided into three categories – those that were to comprise his field reference collection (which of course would have travelled with him), and material sent back to Stevens for sale from which specimens were to be set aside for Bates' personal study collection. Of our four likely sources of Bates material, the great bulk, some 223 specimens came from the collection of Frederick DuCane Godman and Osbert Salvin – this material originally formed Bates' personal study collection which he sold to Godman & Salvin when his interest turned toward coleopterous groups (O'Hara, 1995); it is possible that specimens that originally comprised the reference collection are also included here. The BMNH material was all purchased directly from Stevens, and although we have no supporting evidence, the likelihood is that the specimens acquired by the Austrian Lepidopterists, Catejan and Rudolf Felder, which formed part of the Rothschild Bequest, were similarly bought from Bates' agent. The likely fourth source, W.C. Hewitson's Amazonian material, is more problematic; specimen labels are very general as regards locality and give no indication of collector. In *Exotic Butterflies* (Hewitson, 1852–1876) much material is noted as "Hab. Amazons" generally without further comment; however, supplementary discussion included in individual diagnoses occasionally does indicate a Batesian origin. Given the problematical antecedents of this Hewitson material, we have not included it in our specimen lists.

Virtually all the Godman-Salvin and Felder material, and much of the BMNH material, has considerable thoracic damage consistent with the notion of the specimens having been re-pinned (and re-set?) to conform with the preferred individual collection styles. This material is now nearly all high-set in a manner suggestive of the use of continental-style setting boards which were introduced into the BMNH by A.G. Butler around 1860 (Waterhouse, 1906). But among the BMNH material are scattered individuals with no thoracic damage and low-set in the style of the British saddle-type setting board in widespread use around the middle of the 19th Century. We wonder if these few specimens represent the last remnants of the style and setting method as used by Bates in the field?

Before moving on to how such pinned material might have been safely transported, a couple of important asides regarding the existing specimen labelling. With respect to the Godman-Salvin material, the Batesian antecedents are noted in various ways – but one form of words "Bates Coll." indicates an important distinction; this is the material not collected by Bates himself but acquired by him from various other collectors. And a significant number of specimens carry small numbers that refer back to Bates' two unpublished volumes of field notes held in the Entomology Library at the BMNH. Access through these numbers can reveal further locality data not indicated on the specimen labels themselves. Furthermore, some individuals carry more than one number, so recalling Bates' instructions to Stevens (Bates, 1852: 3322) –

"Recollect that I do not want more than one good specimen of each sex and variety of any saleable species of Lepidoptera and Coleoptera, therefore all duplicates may be separated and sold; and when there is more than one number attached to one species, leave all the numbers pinned to the single specimen reserved for me, as they refer to notes in my books, and will be useful some day."

Returning to our postulated field-set specimens, they would certainly be very cumbersome to transport. Wallace (1905) records how they planned to overcome such difficulties. Prior to their departure to South America, Bates and Wallace visited T. Horsfield at the India Museum in London where they were shown some remarkable contraptions – the cabinets that Horsfield used to transport his material.

"These were stout, oblong boxes, about three feet long by two feet wide and two feet deep. Inside these were vertical grooves, about two inches apart, to hold the boards corked on both sides, on which the insects were pinned. The advantages were that a large number of specimens were packed in a small space, and at much less cost than in storeboxes, while any insects which should accidentally get loose would fall to the bottom, where a small vacant space was left, and do no injury to other specimens. It seemed such an excellent plan that we had a case made like it, and sent home our first collection in it; but though it answered its purpose it was very inconvenient, and quite unsuited to the travelling collector. We therefore returned to the old style of storebox, which we got made in the country, while a very good substitute for cork was found in some of the very soft woods, or in slices of the midribs of palms".

In addition, it seems that Bates had storeboxes shipped-out from England, probably specifically for his travelling reference collection. These were constructed by a Mr Downie –

"my private collection of insects I still retain; it preserves very well in Downie's boxes, and I find it useful for comparison of fresh captures: it contains 2200 specimens" (Bates, 1853b: 3898).

So, with Bates' return from Brazil, it seems that his butterfly material was set, safely stored, and for the most part successfully transported to Stevens who secured realistic prices for the time. But, for Bates, the acquisition of a wife and family made paramount the need for paid work. In 1862, a position became available at the British Museum, specifically with respect to the insect collections. Bates was not optimistic –

"I am told that the vacant place at B.M. will be filled by a young man who has Prof. Owens protection & that it will be little or no use my becoming a candidate" (Stecher, 1969).

But he did apply, albeit unsuccessfully, the position going to a Mr O'Shaughnessy who has since disappeared into obscurity, an appointment that apparently did little for the standing of the Museum in zoological circles. O'Shaughnessy, a minor poet was apparently

"so near-sighted that he could not observe insects with accuracy, so uncoordinated that he could not handle them with delicacy, and so lacking in scientific fervour that he made no efforts to lessen his deficiencies" (Paden, 1964).

If it was the Museum's loss, then it was the Royal Geographical Society's gain, where as is well-documented Bates served as Assistant Secretary from 1864 until his death in 1892.

Insect Fauna of the Amazon Valley, Lepidoptera-Nymphalidae [in part].

Bates introduced this section with a wide-ranging discussion of butterfly behaviour on various nymphalid groups. The species-by-species account that follows covers those amplified in Bates' 1864 paper – these profiles continue in the 1865 publication, not treated here.

Little can be said of general application regarding habits and natural history. [But for those wishing to delve further into general biological aspects of neotropical butterflies, then DeVries 1987 and Neild 1996 continue in the Batesian spirit.] The early states of the insects are much diversified, and it is the same with their haunts and modes of flight. A certain number of genera, belonging more especially to the *Heliconiini*, *Melitaeini* and *Kallimini*, are seen only in open sunny places, such as weedy plantations and the suburbs of towns and villages or the borders of woods. These are never found in the shades of the forest, and the food-plants of their larvae are such as grow only in open semicultivated places. It is interesting, therefore, to find that the only Amazonian genera which are closely related to *Argynnis* and *Nymphalis* of our own country are such as inhabit a sort of localities that both regions afford, and not the great tropical forest which harbours the peculiar forms of South America. The *Melitaeini* of the Amazons are very small and plainly marked; indeed they cannot be compared for size and beauty of form and markings with our English *Melitaea* or *Melicta*, and, like these northern species, they frequent weedy and flowery places on the borders of woods, flying low, and having somewhat of the floating motion in their flight; unlike the insects of the *Nymphalis* group, represented only by *Junonia* in the Amazons region; for these are irregular in the motions of their wings, and settle frequently. *Euptoieta hegesia*, the only butterfly of the Amazons region that has a near resemblance to the *Argynnis* of Europe, inhabits the undulating meadow-districts of the country which lie near the middle part of the lower course of the river and is never seen in the true forest districts. This species, which is about the size of *Argynnis lathonia*, flies about the lower herbage and flowering bushes in the same way as our British *Argynnis*. *Anartia* species and some *Eunica* are also creatures of grassy haunts but they generally prefer the marshy meadows on the banks of rivers.

Other Amazonian butterflies covered here are denizens of the great forest, and nearly all of the genera, are peculiar to Tropical America; being creatures of the humid and luxuriant sylvan domain which spreads over all the river-valleys, and extends in most parts of the region far up the slopes of the mountains, skirting everywhere the margins of rivulets and torrents. If we except the genus *Eresia*, the species of which are no other than *Melitaeini*, with wings lengthened after the manner of their inseparable companions, the *Heliconius*, and which hover about low shrubs in the shade of the forest, the remainder of the Nymphalinae [*sensu* Bates] exclusive of the Morphinae, may be classed, as respects their habits, into five groups. The first comprises a series of genera and species which resemble our *Apatura iris* in manners and style of flight. They live in the crowns of the forest-trees, and descend only to the ground in sunny places to suck the moisture from mud, moist sand, or ordure on the forest-pathways or the margins of pools and streams.

But it is the males almost exclusively that have this latter habit, the females remaining in the forest, where their mates join them, after their summer day's separation, in the afternoons when the sun is getting low. The males in very many of these species are much more brightly coloured than the females, and appear to be much more numerous. In some places, during the fine season (August to October), they assemble by hundreds, sometimes thirty or forty species together, of the most varied shapes and colours, to sport about in muddy places exposed to the morning sun. *Callicore* and *Asterope*, with liveries of velvet crimson and black, or sapphire and orange; *Eunica*, with purple hues glancing in the sunlight as they fly; swallow-tailed *Marpesia* of many species; silky-green *Dynamine*; blue, white, and black *Baeotus*, tailed like the *Charaxes jasius* of Europe, and many other kinds less conspicuous in colour and form, are all seen together, either settled on the ground or swiftly flying to and fro above it. If the day becomes cloudy or windy, the sensitive creatures gradually betake themselves to the shelter of the neighbouring forest. Warm, calm, gleamy weather seems the most favourable to their appearance in the open places, a few females sometimes venturing from the forest at these times to join the company.

The second group is formed by, such species as, having similar habits to those of the first group, never or very seldom leave the forest. Most of the richly coloured *Myscelia*, *Nessaea* and *Catonephele* belong to this category, and also the *Temenis* and others. These have, like many of the preceding, a rapid and irregular flight, the males settling for a few moments at a time on foliage where a ray of sunlight pierces the shades. The third group consists of species allied to the *Limenitis* of Europe, such as the *Adelpha*, many kinds of *Dynamine*, the *Pyrrhogyra*, and others, all of which fly about the lower trees in thinned parts of the forest, and have a floating, partly horizontal, and wheeling flight. If they are disturbed when settled on a leaf near the ground, they wheel round in flying off and settle on a higher place, and so on, until they are out of reach. The fourth group, also shade-lovers, are such as settle only on the trunks of trees; these are the *Tigridia* and *Colobura*, which hold their wings erect in repose, the *Ectima* and *Panacea*, whose wings are partly open, partly closed, when they settle, and the *Hamadryas*, which extend their wings flat on the trunks of trees. These latter are most peculiarly coloured, and differ much from their relatives in their habits, as will be familiar to all readers of travels in Brazil. Lastly, the fifth group is composed of numerous genera and species closely related to our Purple Emperor, which also live habitually in the forest, but have a most rapid flight, and settle frequently on outstretched branches or foliage. They are all bold creatures, not moving from their perches until driven off, and, even when scared away, returning to them after a few minutes' absence, dashing meanwhile with arrowy swiftness along the forest-alleys. Such are the species of *Agrias*, the most beautiful genus in the whole subfamily; the *Prepona*, the *Siderone*, and the *Paphia*, of all of which there are numerous species in the Amazons region, some of them extremely common.

A few words may be said, in conclusion, regarding the habits of the species of the *Morpho* group, which differ quite as much amongst themselves as they do from the other Nymphalids. They are all, it is true, creatures of the great forest; but whilst some

have a flapping and undulating flight, straight onward along the alleys of the forest, and near the ground, others are never seen, except steadily gliding, with outstretched wings from 20 to 100 feet above the ground; here they move across sunny spaces between the crowns of the taller trees. The low-flyers are *M. achilles*, *M. deidamia*, *M. menelaus*, and their subspecies; the high-flyers, *M. uraneis*, *M. rhetenor*, *M. telemachus*, *M. cisseis*, and *M. hecuba*: the three latter of which are very seldom observed to flap their wings as they lazily fly along, whilst *uraneis* and *rhetenor* do so at every dozen or so yards of their course. *M. achilles* and its allies, moreover, settle frequently on the ground to suck the juices from fallen fruit, in the company of *Temenis*, *Ariadne*, *Nica sylvestris*, *Antirrhea*, *Taygetis*, *Hetaera*, &c.; but the members of the other section of the *Morphos* never descend to the ground. Indeed it is only very early on calm sunny mornings and towards midday, just before a thunderstorm, that they are tempted or forced to descend from their great elevation.

LEPIDOPTERA DIURNA
 Family **Nymphalidae**
 Subfamily **HELICONIINAE**¹
 Tribe **HELICONIINI**
 Genus *PHILAETHRIA* Billberg

The species of *Philaethria*, *Dryadula* and *Dryas* are seen only in open, sunny places; such as waste grounds, gardens, and the borders of woods, where flowering bushes grow. They are never found in the great forest, but seem to be attendants on man, making their appearance wherever a clearing is commenced in the woods. They have not a very rapid flight, nor much of the floating mode of progression when on the wing, but move about somewhat irregularly and settle frequently, their attraction being always flowers, and never moisture or filth on the ground, as is the case with the more typical nymphalid genera.

Philaethria dido (Linnaeus)
 Plate 1. Fig. 1.

1. *Colaenis Dido*, L.

This handsome and well-known insect is generally distributed throughout the Amazons region, its great expanse of wing and clear grassy-green colour making it a conspicuous object in all semicultivated places near settlements. Guiana and Amazoniae seem to be the headquarters of the species. [Now regarded as a complex of up to six species (see Suomalainen & Brown, 1984). We believe that Bates' specimens are true *P. dido* but many of the available host plant records and life history descriptions, historically associated with *dido*, are probably applicable to one or other of its siblings.]

¹Bates' concept of Heliconiinae was curious (but sufficient to recognise the phenomenon of mimicry; Bates, 1862a, revised anonymously by Vane-Wright, 1981) – he recognised Danaoid Heliconiidae (in modern terms the Ithomiinae plus the danaine genera *Lycorea* and *Ituna*) and Acraeoid Heliconiidae (*Heliconius sensu lato* and *Eueides*). Species currently placed within *Philaethria*, *Dryadula*, *Dryas*, *Dione* and *Agraulis*, he regarded as true nymphalines. Modern syntheses e.g. Penz (1999) and Brower & Eagan (1997) place members of these genera firmly within the Heliconiinae.

Life history: Young, 1974.

Host-plants: *Passiflora* sp. (Passifloraceae).

BMNH(E) #144194 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144195 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *DRYADULA* Michener

Dryadula phaetusa (Linnaeus)

Plate 1. Fig 2.

2. *Colaenis Phaerusa*, L.

Also a generally distributed and common insect, found in company with *Philaethria*. Its range seems to extend farther to the north than *Philaethria*, as Mr. Osbert Salvin found it abundantly in Guatemala, where its companion did not occur.

Host-plants: *Passiflora* sp. (Passifloraceae).

BMNH(E) #143666 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143667 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *DRYAS* Hübner

Dryas iulia (Fabricius)

Plate 1. Fig. 3.

3. *Colaenis Julia*, Fab.

Equally common and widely dispersed with *Dryadula phaetusa*. It ranges over nearly the whole of Tropical America.

Life history: Muyschondt, 1973a.

Host-plants: *Passiflora* sp. (Passifloraceae).

BMNH(E) #143672 ♀ BRAZIL Ega leg. W.H. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143673 ♂ BRAZIL Ega leg. W.H. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *DIONE* Hübner

The remarks made on the genera *Philaethria*, *Dryadula* and *Dryas* apply equally to *Dione* and *Agraulis*.

Dione juno (Cramer)

Plate 1. Fig. 4.

4. *Agraulis Juno*, Fab.

The range of this species seems to be pretty nearly coincident with those of *Dryadula phaetusa* and *Dryas iulia*; but the insect appears to be subject to a greater amount of local modification than these two. In the humid forests of Ecuador, on the western slope of Chimborazo, at an elevation of 3000 or 4000 feet, the type seems to be wholly replaced by one of these local forms, which is so well-marked as to deserve a separate name and mention².

² Sent in some number by Mr. Spruce, the well-known botanical traveller.

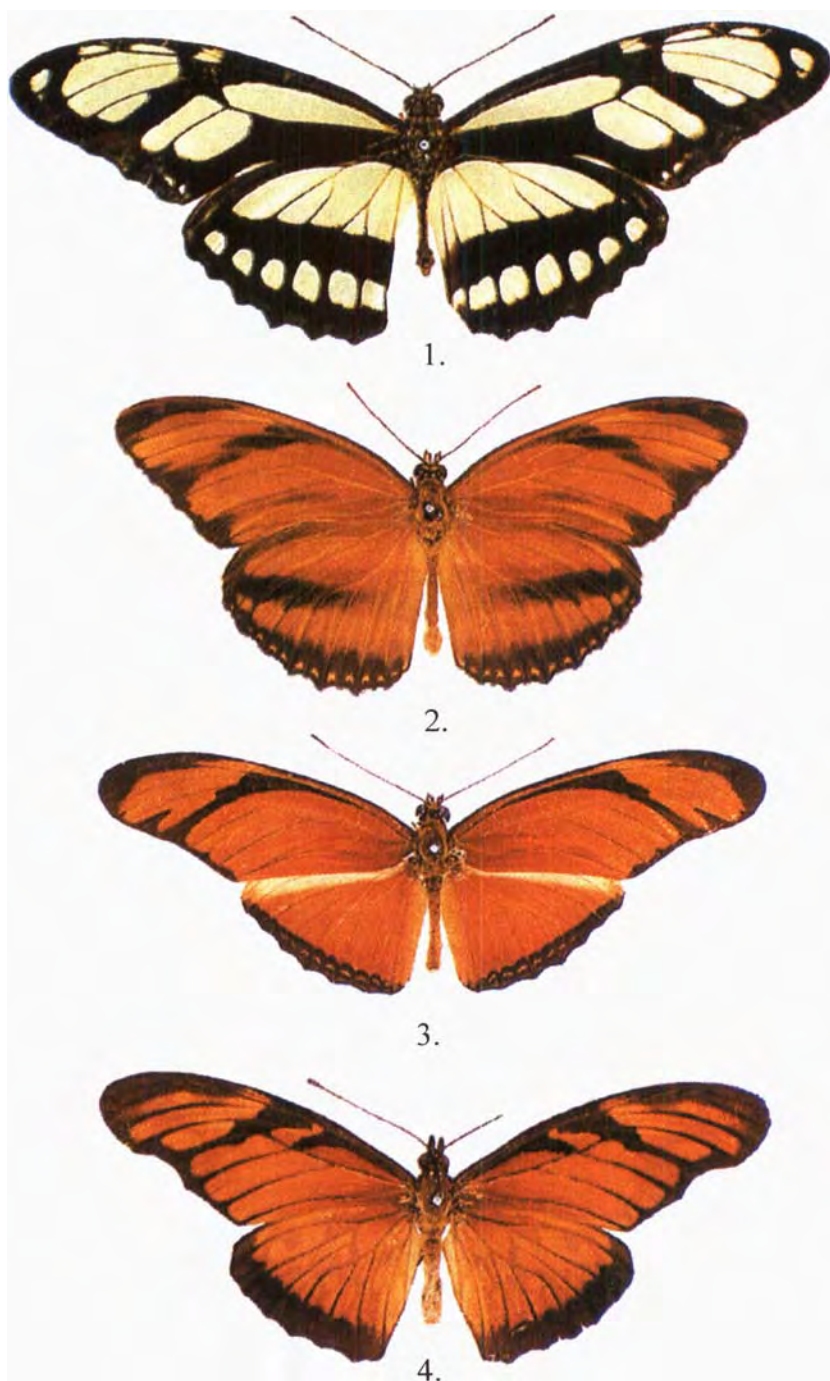


Plate 1. **Fig. 1,** Specimen 144194 *Philaethria dido* (Linnaeus); **Fig. 2,** 143667 *Dryadula phætusa* (Linnaeus); **Fig. 3,** 143673 *Dryas iulia* (Fabricius); **Fig. 4,** 143669 *Dione juno* (Cramer).

Life history: Muyschondt *et al.*, 1973.

Host-plants: *Passiflora* sp. (Passifloraceae), *Erblichia odorata* (Turneraceae).

BMNH(E) #143670 syntype ♂ [*Agraulis andicola* Bates] ECUADOR Tacunga Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143671 syntype ♂ [*Agraulis andicola* Bates] ECUADOR Canelos Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143669 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144196 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144197 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *AGRAULIS* Boisduval & Leconte

Agraulis vanillae (Linnaeus)

Plate 2. Fig. 5.

5. *Agraulis Lucina*, Felder.

6. *Agraulis Vanillae*, L.

This well-known and very common species has the widest range of all the members of the Heliconiinae, being found throughout Brazil, and as far north as the Southern States of Northern America, including the West India Islands. *Agraulis vanillae lucina* was common at Ega, Upper Amazons, flying over flowering bushes on the borders of the forest.

Life history: Toledo, 1992.

Host-plants: *Passiflora* sp. *Tetrastylis ovalis* (Passifloraceae).

BMNH(E) #143668 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144198 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144199 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *EUPTOIETA*, Doubleday

This genus of Fritillaries forms the nearest approach that Tropical America offers to the beautiful *Argynnis* group, so rich in species and abundant in individuals in the northern temperate zone in both hemispheres.

Euptoieta hegesia (Cramer)

Plate 2. Fig. 6.

7. *Euptoieta Hegesia*, Cram.

Abundant in open grassy tracts of country, or campos, in the middle part of the Lower Amazons, both on the north and south sides of the river; flying slowly, and settling on flowering leguminous shrubs and other plants; never seen in the forests. The species has a wide range, being found in South Brazil and throughout Guiana as far north as Guatemala, where it occurs in company with the closely allied *Euptoieta claudia*, without showing transition forms.

Life history: Schappert & Shore, 1998.

Host-plants: *Passiflora foetida*, *P. helleri*, *P. quadrangularis* *P. rovirosae*, *P. suberosa*, *P. nr violacea* (Passifloraceae), *Turnera diffusa*, *T. scabra*, *T. subulata?* *T. ulmifolia* (Turneraceae), *Hybanthus attenuatus* (Violaceae).

BMNH(E) #143664 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143665 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Subfamily NYMPHALINAE
 Tribe MELITAEINI³

Genus *ORTILIA* Higgins
Ortilia liriopae (Cramer)
 Plate 2. Fig. 7.

8. *Melitaea liriopae*, Cramer

A common insect in open, weedy, and shrubby places near towns; flying in a sailing manner over low bushes.

BMNH(E) #143674 ♀ BRAZIL Para leg. W.H. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143675 ♀ BRAZIL leg. Bates Ex. N.C. Rothschild B.M. 1928-259 via Felder coll.
 BMNH(E) #144200 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144201 ♂ BRAZIL Amazon leg. Bates Ex. Felder

Genus *TEGOSA* Higgins
Tegosa fragilis (Bates)
 Plate 2. Fig. 10.

9. *Melitaea fragilis*, n. sp.

This species seemed wholly to replace *O. liriopae* on the banks of the Cupari, a branch of the Tapajos, where it was common in weedy cacao-groves.

BMNH(E) #143706 Lectotype ♂ BRAZIL Cupari Tapajos R. leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143707 ♂ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143708 ♂ BRAZIL Tapajos leg. H.W. Bates

Genus *MAZIA* Higgins
Mazia amazonica (Bates)
 Plate 2. Fig. 11.

10. *Melitaea Amazonica*, n. sp.

Common and generally distributed throughout the Amazons region in open, scrubby, weedy areas.

BMNH(E) #143693 ♂ Lectotype BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143692 Type ♀ BRAZIL Serpa leg. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143694 ♂ BRAZIL Fonteboa Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143695 ♂ PERU Pebas Bates coll. Ex. Godman-Salvin B.M. 1915-3

Genus *ERESIA*, Boisduval

The *Eresia* are true forest-dwellers. They do not, however, differ much in any essential character from the *Melitaea*, which, as all European entomologists well know, inhabit only meadows or open, heathy, and flowery places. The *Ortilia* and *Tegosa* of Tropical America, which differ a little in the shape of the palpi and in length of wing from the

³ The arrangement adopted here follows Higgins, 1981.

northern *Melitaea*, form the connecting link between the two genera; so that the *Eresia* may be looked upon as forest *Melitaea* with wings lengthened in the manner of the *Heliconiinae*. The species have a low and rather weak flight.

Eresia eunice (Hübner)

Plate 2. Fig 8.

11. *Eresia Eunice*, Hübner

A very common insect in thinned parts of the forest throughout the Amazons region. It flies near the ground in a floating and hovering manner, settling now and then on low plants. I have never seen it on the outside of the forest. The species varies much according to locality, following in the local variation of its colours the same rule as *Mechanitis polymnia*, *Heliconius numata*, and other fulvous-coloured butterflies; that is, having lighter belts across the fore wings in the region near the Atlantic, and becoming more uniform in tint in the interior of the continent. The shape of the black streaks also varies.

Host-plants: *Fittonia argyroneura* (Acanthaceae).

- BMNH(E) #143682 ♂ BRAZIL Fonteboa Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143683 ♀ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143685 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143686 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143687 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143688 ♂ BRAZIL leg. Bates Ex. Felder
 BMNH(E) #143689 ♂ BRAZIL leg. Bates Ex. Rothschild bequest B.M. 1939-1 via Felder coll.
 BMNH(E) #143690 ♂ ECUADOR Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144202 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144203 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144204 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144205 ♂ BRAZIL Espirito Santo Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144206 ♀ BRAZIL Para leg. H.W. Bates B.M. 1949-49
 BMNH(E) #144155 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-111
 BMNH(E) #144156 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-111
 BMNH(E) #144157 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43
 BMNH(E) #144158 ♀ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1849-49
 BMNH(E) #144159 ♀ BRAZIL Japayos leg. H.W. Bates Ex. H.W. Bates B.M. 1853-27
 BMNH(E) #143684 Lectotype ♂ [*Eresia eunice* var. *olivencia* Bates] BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eresia aveyrona Bates

12. *Eresia Aveyrona*, n. sp.

At Aveyros, on the Tapajos – one example only.

- BMNH(E) #143691 Holotype ♀ BRAZIL Aveyros leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eresia nauplius (Linnaeus)

13. *Eresia Nauplia*, Linn.

A very common insect in the same situations as *Eresia eunice*, namely, in thinned parts of the forest; flying low, over bushes and shrubs.

- BMNH(E) #143676 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143677 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

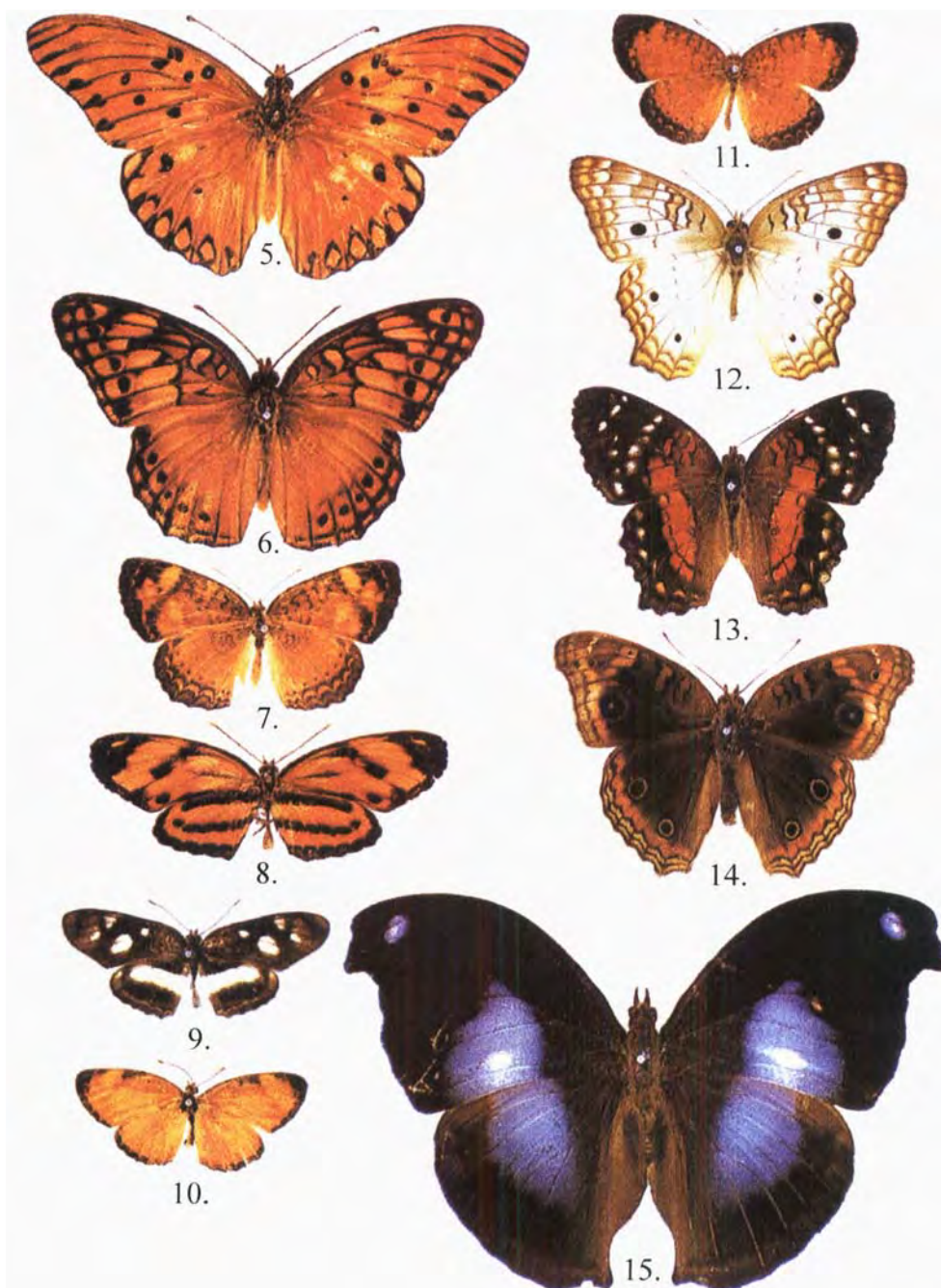


Plate 2. Fig. 5, 144199 *Agraulis vanillae* (Linnaeus); Fig. 6, 143665 *Euptoieta hegesia* (Cramer); Fig. 7, 143674 *Ortilia liriopoe* (Cramer); Fig. 8, 143682 *Eresia eunice* (Hübner); Fig. 9, 143681 *Eresia clara* (Cramer); Fig. 10, 143706 *Tegosa fragilis* (Bates); Fig. 11, 143693 *Mazia amazonica* (Bates); Fig. 12, 143699 *Anartia jatrophae* (Linnaeus); Fig. 13, 143701 *Anartia amathea* (Linnaeus); Fig. 14, 143711 *Junonia evarete* (Cramer); Fig. 15, 143709 *Napeocles jucunda* (Hübner).

BMNH(E) #143678 ♀ FRENCH GUIANA Cayenne Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143679 ♀ FRENCH GUIANA Cayenne Bates coll. Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #144160 ♂ BRAZIL Japayos leg. H.W. Bates Ex. H.W. Bates B.M. 1853-27

Eresia clara Bates

Plate 2. Fig. 9.

14. *Eresia Clara* (nob.)

BMNH(E) #143681 Lectotype ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3
 BMNH(E) #143680 Type ♀ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

Tribe KALLIMINI

Genus *ANARTIA* Hübner

A group peculiar to Tropical America and not very closely related to any other known genus. The species have the habits and mode of flight of *Vanessa* and *Junonia* and are found only in open, weedy, and bushy places, chiefly in the neighbourhood of towns.

Anartia jatrophae (Linnaeus)

Plate 2. Fig. 12.

15. *Anartia Jatrophae*, L.

A very common insect in all waste places throughout the country. It seems to be equally common throughout the whole of Tropical America, undergoing scarcely any local modification.

Life history: Rawson, 1976.

Host-plants: *Blechum pyramidatum*, *Hygrophila costata*, *Ruellia occidentalis*, *R. tuberosa* (Acanthaceae), *Hyptis atrorubens*, *Melissa officinalis*, *Mentha pulegium*, *M. nr piperita*, *Stachys arvensis* (Labiatae), *Bacopa monnieri*, *Lindernia diffusa* (Scrophulariaceae), *Aloysia triphylla*, *Lantana hispida*, *Lippia alba*, *L. controversa*, *Phyla dulcis*, *P. nodiflora*, *P. reptans*, *Phyla scaberrima* (Verbenaceae).

BMNH(E) #143696 ♂ PERU E Peru Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143697 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143698 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143699 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Anartia amathea (Linnaeus)

Plate 2. Fig. 13.

16. *Anartia Amalthea*, L.

Also a common insect, preferring, however, the moister districts. It extends southward as far as 30° S. lat., undergoing some little local modification.

Life history: Silberglied *et al.*, 1980.

Host-plants: *Acanthus* sp. *Blechum costaricense*, *B. pyramidatum*, *Dicliptera sericea*, *D. unguiculata*, *Justicia axillaris*, *J. brandegeana*, *J. brasiliensis*, *J. candelariae*, *J. carnea*, *J. rizzinii*, *Pseuderanthemum* sp., *Ruellia brevifolia*, *R. coerulea*, *Strobilanthes* sp. (Acanthaceae), *Melissa officinalis* (Labiatae), *Phyla nodiflora* (Verbenaceae).

BMNH(E) #143700 ♀ BRAZIL Para leg. Bates B.M. 1849–49
 BMNH(E) #143701 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915–3
 BMNH(E) #143702 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915–3
 BMNH(E) #143703 ♂ PERU E. Peru Bates coll. Ex. Godman-Salvin B.M. 1915–3
 BMNH(E) #143704 ♂ BRAZIL Bahia Bates coll. Ex. Godman-Salvin B.M. 1915–3
 BMNH(E) #143705 ♂ BRAZIL Rio Grande Bates coll. Ex. Godman-Salvin B.M. 1915–3

Genus *JUNONIA* Hübner.

Junonia is chiefly an old-world group, its metropolis being South-eastern Africa, with Madagascar; although one or more species occur in the hot zones of the whole world. They are amongst the most richly ornamented of the whole section of Diurnal Lepidoptera, and have very little of the typical nymphaline floating motion, flying near the ground in open, flowery, and bushy places. Found only in the neighbourhoods of the larger towns.

Junonia evarete (Cramer)⁴

Plate 2. Fig. 14.

17. *Junonia Lavinia*, Cramer

A common insect in grassy lanes and old gardens near Pará. It varies considerably in colours and markings.

Life history: Turner & Parnell, 1985 (as *genoveva*, A. Neild, pers. comm.).

Host-plants: *Barleria cristata*, *Blechnum pyramidatum*, *Ruellia tuberosa* (Acanthaceae), *Stachytarpheta cayennensis*, *Stachytarpheta jamaicensis* (Verbenaceae).

BMNH(E) #143711 ♂ BRAZIL Para Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #143712 ♂ BRAZIL Para Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #143713 ♂ BRAZIL Para Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #143714 ♂ ECUADOR Chimborazo leg. Spruce Bates coll. Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #143715 ♂ COLOMBIA Bogota Bates coll. Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #144161 ♂ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1849–49
 BMNH(E) #144162 ♀ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1849–49

Genus *NAPEOCLES* Bates.

Napeocles jucunda (Hübner)

Plate 2. Fig. 15.

18. *Salamis (Napeocles) jucunda*, Hübn.

This fine insect, which, as already observed, has no near relative in Tropical America, is found only in swampy and thinned parts of the forest that clothes the delta-lands of the Amazons in the neighbourhood of Pará, on the island of Marajü, and near the mouth of the Tocantins. It prefers the humid cacao-groves on the islands, settling on fallen fruits; its flight is low, but exceedingly swift.

Host-plants: *Ruellia cordifolia* (Acanthaceae).

BMNH(E) #143709 ♂ BRAZIL Para Ex. Godman-Salvin B.M. 1907–180
 BMNH(E) #143710 ♀ BRAZIL Para Ex. Godman-Salvin B.M. 1907–180

⁴ *Junonia lavinia* sensu Bates is currently regarded as synonymous with *Junonia evarete*, itself only recently regarded as distinct from *Junonia genoveva* (see Turner & Parnell, 1985; also Neild, in prep.). We have only included those host-plant records that can be unequivocally assigned to *J. evarete*.

Subfamily BIBLIDINAE

Tribe BIBLIDINI

Genus *EUNICA* Hübner.⁵

With *Eunica* commences the series of typical nymphalid-forest butterflies whose larvae, as far as known, have long-branched spines to their heads, besides the usual shorter-branched spines on the segments of the body. They are all strong in flight, although differing in habits and mode of progression, as explained in the introduction. *Eunica* has no close relationship to any of the foregoing genera, but is intimately linked with several of those which follow, such as *Callicore*, *Antigonis* and so forth.

Like most of the typical nymphalids, the males in the great majority of the species differ greatly in colours and in habits from the females; being adorned with glossy blue and violet hues on a black ground, whilst their partners are dull brown with white spots; and leaving their females in the woods to resort with crowds of their fellows to sport in the sunshine, or imbibe moisture from the margins of streams and muddy places.

Eunica phasis Felder19. *Eunica Phasis*.

Found sparingly in the interior of the country; on the banks of the Tapajos, and on the Upper Amazons and Rio Negro.

BMNH(E) #143716 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143717 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica anna (Cramer)

Plate 3. Fig. 16.

20. *Eunica Anna*, Cramer

Ega, Upper Amazons; rare.

BMNH(E) #143728 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143729 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143730 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144167 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

Eunica malvina Bates

Plate 3. Fig. 17.

21. *Eunica Malvina*, n. sp.

I found this species both on the Upper and Lower Amazons, but it was nowhere common.

Host-plants: *Mabea occidentalis*, *M. taquari* (Euphorbiaceae).

BMNH(E) #144207 Holotype ♀ BRAZIL Obydos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144208 Syntype ♂ BRAZIL Obydos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143735 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143736 ♀ BRAZIL Villa Nova leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144163 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

⁵The arrangement adopted here follows Jenkins, 1990.

Eunica concordia Hewitson22. *Eunica Concordia*, Hewits.

Banks of the Tapajos and the Upper Amazons; common at Ega.

BMNH(E) #144209 ♂ Syntype BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143725 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143726 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143727 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144168 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

Eunica mygdonia (Godart)23. *Eunica Mygdonia*, Godt.

A common insect on the Upper Amazons, extending eastward as far as Villa Nova.

Host-plants: *Mabea occidentalis*, *M. taquari* (Euphorbiaceae).

BMNH(E) #143722 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143723 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143724 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144169 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

BMNH(E) #144170 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

Eunica amycla (Godart)24. *Eunica Careta*, Hewits.

A very common species, at Ega, Upper Amazons.

BMNH(E) #143718 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143719 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143720 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143721 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144164 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #144165 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

BMNH(E) #144166 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1857-20

Eunica caelina (Godart)25. *Eunica Caelina*, Godt.

This South-Brazilian species was one of the rarest of its genus on the Upper Amazons.

I met with males only. Its flight is more rapid than that of its congeners.

BMNH(E) #143733 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143734 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144171 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

Eunica cinara (Hewitson)26. *Eunica Cinara*, Hewits.

Upper Amazons, at Ega, Tunantins, and St. Paulo.

BMNH(E) #144212 Syntype ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143731 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143732 ♂ BRAZIL Tunantins leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica volumna (Godart)27. *Eunica Celma*, Hewits.

I met with a few examples only at Ega.

Host-plants: *Calophyllum brasiliense* (Guttiferae).

BMNH(E) #144213 Syntype ♂ [*Cybdelis celma* Hewitson] BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143737 ♂ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica bechina (Hewitson)

Plate 3. Fig. 18.

28. *Eunica Bechina*, Hewits.

Upper Amazons; an abundant species.

Life history: Oliveira & Freitas, 1992; Freitas & Oliveira 1994.

Host-plants: *Caryocar brasiliense* (Caryocaraceae).

BMNH(E) #143739 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143740 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144174 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #144175 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #143738 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica sydonia (Godart)29. *Eunica Caresa*, Hewits.

One example only occurred of this insect, namely, at Ega.

Host-plants: *Mabea occidentalis* (Euphorbiaceae).

BMNH(E) #143741 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica clytia (Hewitson)30. *Eunica Clytia*, Hewits.

The commonest species of the genus at Ega; in some years appearing by hundreds (almost all males) on the muddy margins of the river, in August and September.

BMNH(E) #143742 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143743 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143744 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144176 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #144177 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #144178 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

Eunica veronica Bates

Plate 3. Fig. 19.

31. *Eunica Veronica*, n. sp.

The range of this species lies further to the west than Ega, at which station I did not meet with it at all. It was very abundant near Tunantins and St. Paulo, in company with a small number of *E. clytia*.

BMNH(E) #143746 Paratype ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143745 ♂ BRAZIL U. Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

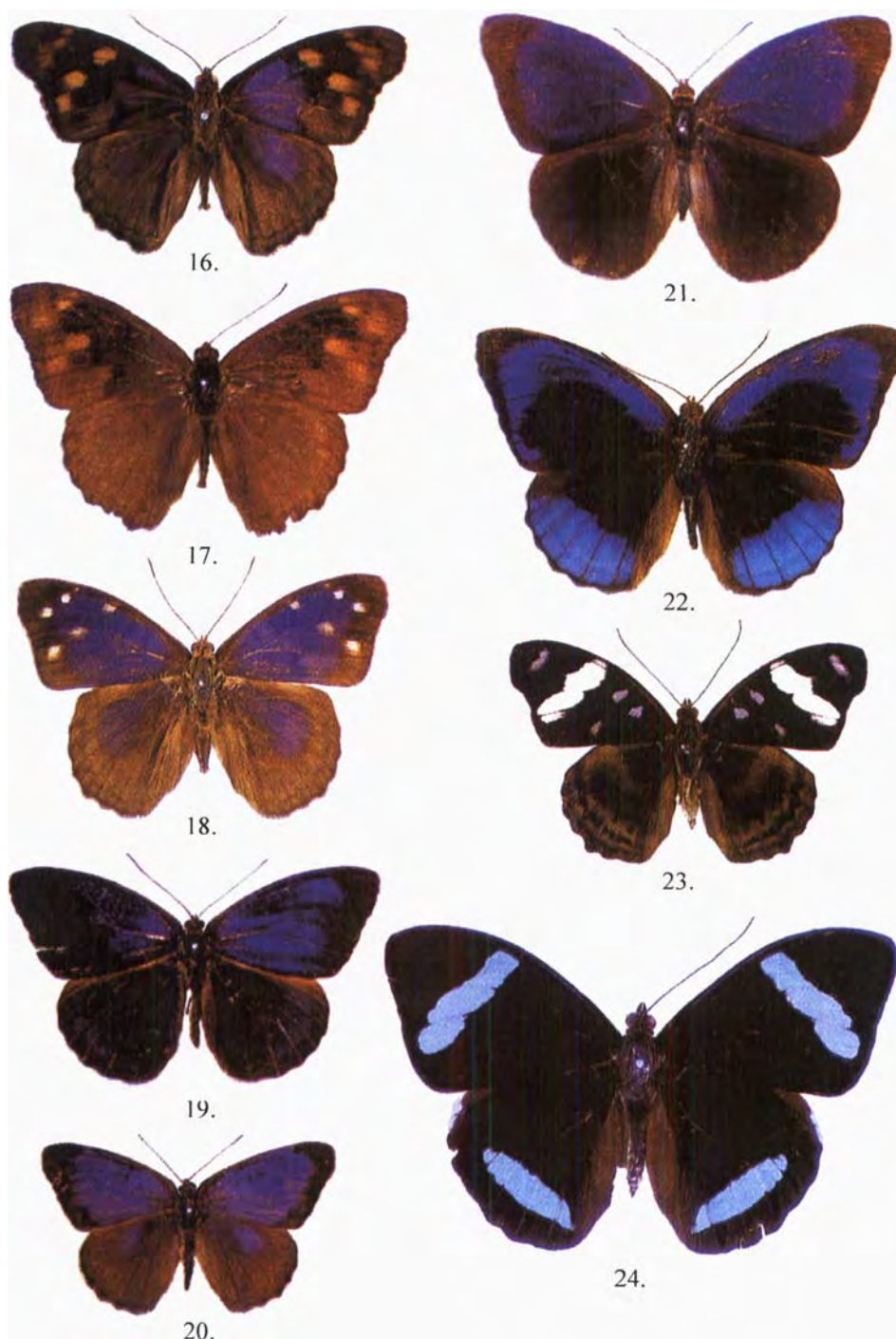


Plate 3. Fig. 16, 143728 *Eunica anna* (Cramer); Fig. 17, 143735 *Eunica malvina* Bates; Fig. 18, 144175 *Eunica bechina* (Hewitson); Fig. 19, 143745 *Eunica veronica* Bates; Fig. 20, 144214 *Eunica pusilla* Bates; Fig. 21, 144217 *Eunica viola* Bates; Fig. 22, 144187 *Eunica eurota* (Cramer); Fig. 23, 143781 *Myscelia capenas* (Hewitson); Fig. 24, 144226 *Nessaea hewitsoni* (Felder & Felder).

Eunica pusilla Bates

Plate 3. Fig. 20.

32. *Eunica pusilla*, n. sp.

BMNH(E) #144215 Holotype ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144214 Syntype ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143758 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144181 ♂ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1849-49

Eunica orphise (Cramer)33. *Eunica Orphise*, Cramer.

Upper Amazons; rare at Ega, but more abundant a few hundred miles further west, at St. Paulo. I met with only one female, namely, in the heart of the forest at Ega.

BMNH(E) #143759 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143760 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143761 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144182 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1857-20

BMNH(E) #144183 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-69

BMNH(E) #144184 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1856-111

Eunica viola Bates

Plate 3. Fig. 21.

34. *Eunica viola*, n. sp.

This species has pretty nearly the same range as *E. veronica*; the two being found in great numbers at Tunantins and St. Paulo. It also occurred further east, at Ega, but was there a very rare insect.

BMNH(E) #144216 Holotype ♀ BRAZIL Tunantins leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144217 Syntype ♂ BRAZIL Tunantins leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143755 Paratype ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143756 Paratype ♂ BRAZIL Tunantins leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143757 ♂ BRAZIL U. Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144179 ♂ BRAZIL Jebating leg. H.W. Bates Ex. H.W. Bates B.M. 1858-84

BMNH(E) #144180 ♂ BRAZIL Fonte Boa leg. H.W. Bates Ex. H.W. Bates B.M. 1857-125

Eunica eurota (Cramer)

Plate 3. Fig. 22.

35. *Eunica Eurota*, Cramer.

A very abundant species in some parts of the Upper Amazons. I once saw it in flocks of many hundred individuals (males only), flying over a half-dry watercourse near the village of Cai ara.

BMNH(E) # 43748 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143749 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144185 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

BMNH(E) #144186 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

BMNH(E) #144187 ♂ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1851-43

Eunica amelia (Cramer)36. *Eunica Amelia*, Cramer.

Very abundant at St. Paulo, Upper Amazons; the males being attracted by scores to the dung of vultures, on the borders of the woods.

BMNH(E) #143750 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143751 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143752 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143753 ♂ BRAZIL S. Paulo leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143754 ♀ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica sophonisba (Cramer)37. *Eunica Sophonisba*, Cramer

It is an exceedingly wary insect, and one of the most difficult to capture; so that, although I saw many, I did not obtain more than three or four specimens. It occurred at St. Paulo, Upper Amazons, and also near the mouth of the Rio Negro.

Host-plants: *Mabea* sp. (Euphorbiaceae).

BMNH(E) #143762 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143763 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143764 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Eunica cuvierii (Godart)38. *Libythina Cuvierii*, Godart

Found, in the Amazons region, only in the neighbourhood of Santarem and on the shores of the Lower Tapajos, frequenting not the forest, but swampy meadows, where both sexes fly slowly about low bushes.

BMNH(E) #143765 ♂ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143766 ♀ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143767 ♂ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143768 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144188 ♂ BRAZIL Japayos leg. H.W. Bates Ex. H.W. Bates B.M. 1853-27

[Probably an alternative for Tapajos.]

BMNH(E) #144189 ♂ BRAZIL Santarem leg. H.W. Bates Ex. H.W. Bates B.M. 1853-92

Genus *MYSCELIA* Doubleday⁶

The males of the *Eunica* resort in crowds to the banks of streams, retiring in the evening to the crowns of the forest-trees, where the females reside; but the *Myscelia*, *Nessaea* and *Catonephele* are true forest-dwellers, the males being seen sporting in gleams of sunlight which penetrate the dense shades, and the females wandering amongst the lower trees. I bred one species *Catonephele acontius*: the larva is light green, with steel-blue head, and is armed with branched spines, two of which on the head are of great length and verticillate - the pupa is light green, varied with pink, and has the back of the thorax deeply excavated and irregular in outline. In form and armature the larva agrees with those of the *Asterope*. The sexes in *Catonephele* are so dissimilar in the

⁶ The arrangement adopted here follows Jenkins, 1984.

form as well as in the colour of the wings, that they were long held to belong to different genera - quite an excusable error, for in no group does the divergence in appearance between male and female attain such great proportions. All doubt upon the subject, however, was removed by my capturing the sexes of two of the species *in copula*.

Myscelia capenas (Hewitson)

Plate 3. Fig. 23.

39. *Epicalia Capenas*.

Upper Amazons. in open sunny places in the forest.

Host-plants: *Croton* sp (Euphorbiaceae).

BMNH(E) #143779 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143780 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143781 ♂ BRAZIL Ega Ex. Bates B.M. 1857-20

BMNH(E) #143782 ♂ BRAZIL Ega Ex. Bates B.M. 1856-111

BMNH(E) #143783 ♀ BRAZIL Ega Ex. Bates B.M. 1857-20

Genus *NESSAEA* Hübner⁷

Nessaea hewitsoni (Felder & Felder)

Plate 3. Fig. 24.

40. *Epicalia Hewitsonii*, Felder

Upper Amazons, at St. Paulo, and in the district lying near the Peruvian and Brazilian frontiers. It flies in company with *N. obrina* in moist parts of the forest.

Host-plants: *Alchornia* sp., *Plukenetia* sp. (Euphorbiaceae); reared by P. DeVries (pers. comm.).

BMNH(E) #144225 Lectotype ♂ BRAZIL Amazon leg. H.W. Bates Ex. Rothschild B.M. 1939-1 via Felder coll.

BMNH(E) #144226 ♂ BRAZIL Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Nessaea batesii (Felder & Felder)

Plate 4. Fig. 25.

41. *Epicalia Batesii*, Felder

The species is found, in company with *N. obrina*, at Pará.

BMNH #144544 Lectotype ♂ BRAZIL amazons Bates Ex. Felder

BMNH(E) #143785 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143786 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143787 ♂ BRAZIL S. Paulo [Para] leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143788 ♂ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1915-3

Nessaea obrina (Linnaeus)

Plate 4. Fig. 26.

42. *Epicalia ancea*, Linn.

This superb butterfly is abundant in swampy parts of the forest at Pará; and is found, in fewer numbers, throughout the Amazons Valley, with the exception of certain districts,

⁷ The arrangement adopted here follows Vane-Wright, 1979, and Jenkins, 1989.

such as the neighbourhood of Ega where it is entirely absent. Its flight is exceedingly rapid; but it delights to settle on foliage where a ray of sunlight penetrates the shade.

Life history: Vane-Wright, 1979.

Host-plants: *Alchornea* sp., *Plukenetia* sp. (Euphorbiaceae); reared by P. DeVries (pers. comm.).

BMNH(E) #144227 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144228 ♀ BRAZIL Amazons Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144229 ♂ BRAZIL Amazons leg. H.W. Bates Ex. Rothschild B.M. 1939-1 via Felder coll.

BMNH(E) #144230 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #144231 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

Genus *CATONEPHELE* Hübner⁸

Catonephele numilia (Cramer)

Plate 4. Fig. 27.

43. *Epicalia Numilia*, Cramer.

The species occurs sparingly throughout the Amazons region as far as the head-waters of the Rio Negro, where Wallace observed it. It also occurs in New Granada, and in the central valleys of Guatemala.

Life history: Muyschondt, 1973b; Urich, 1980.

Host-plants: *Alchornea costaricensis*, *A. iricurana*, *A. latifolia*, *A. triplinervia*, *Aparisthmium cordatum* (Euphorbiaceae).

BMNH(E) #143784 ♀ BRAZIL Ega Ex. Bates B.M. 1857-20

Catonephele antinoe (Godart)

Plate 4. Fig. 28

44. *Epicalia Antinoë*, Godart

The species occurred at Obydos, on the Guiana side of the Lower Amazons, and again at St. Paulo, on the Upper Amazons.

BMNH(E) #143769 ♀ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143770 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143771 ♀ BRAZIL Santarem Ex. Bates B.M. 1854-63

Catonephele acontius (Linnaeus)

Plate 4. Fig. 29.

45. *Epicalia Acontius*, Linnaeus.

Common throughout the Amazons region and Guiana; but apparently not found much further northward, as it is not contained in the large collections made by Mr. Osbert Salvin in Guatemala.

Host-plants: *Alchornea iricurana*, *A. triplinervia*, *Aparisthmium cordatum* (Euphorbiaceae).

BMNH(E) #143772 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143773 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

BMNH(E) #143774 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915-3

⁸ The arrangement adopted here follows Jenkins, 1985a.

BMNH(E) #143775 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1915–3
 BMNH(E) #143776 ♀ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1915–3

Catonephele salacia (Hewitson)

Plate 4. Fig. 30.

46. *Epicalia Salacia*, Hewits.

Found only on the Upper Amazons, from Ega to the frontier of Peru.

BMNH(E) #143777 ♀ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1915–3

BMNH(E) #143778 ♂ BRAZIL Ega leg. Bates Ex. Godman-Salvin B.M. 1915–3

Genus *TEMENIS*, Hübner.

Species are forest-dwellers, and have the habit of descending to settle near muddy puddles in the pathways.

Temenis pulchra (Hewitson)

Plate 4. Fig. 31.

47. *Temenis pulchra*, Hewits.

Found sparingly throughout the Amazons region.

BMNH(E) #143988 ♂ PERU Bates coll. Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143989 ♂ PERU Ex. Godman-Salvin B.M. 1918–4

Temenis laothoe (Cramer)

Plate 4. Fig. 32.

48. *Temenis Ariadne*, Cramer.

Life history: Muysshondt, 1974.

Host-plants: *Stigmaphyllon* sp. (Malpighiaceae), *Cardiospermum grandiflorum*, *C. halicacabum*, *Paullinia costaricensis*, *P. cururu*, *P. fuscescens*, *P. pinnata*, *P. rugosa*, *P. seminuda*, *Serjania atrolineata*, *S. meridionalis*, *S. mexicana*, *S. multiflora*, *S. paucidentata*, *S. schiedeana*, *Urvillea ulmacea* (Sapindaceae).

BMNH(E) #143990 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143991 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143992 ♂ BRAZIL Santarem Ex. Bates B.M. 1853–92

BMNH(E) #143993 ♀ BRAZIL Villa Nova Ex. Bates B.M. 1855–44

BMNH(E) #143994 ♂ BRAZIL Fonta Boa Bates coll. Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143995 ♀ BRIT. GUIANA Demerara Bates coll. Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143996 ♀ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143997 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1918–4

BMNH(E) #143998 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1918–4

Genus *NICA* Hübner

The only character which distinguishes *Nica* from *Temenis* is the peculiar pattern of the under surface of the wings, which shows a nearer affinity to the following genus, *Peria*. The neurulation, shape of antennae and palpi are nearly the same as in *Temenis*; but the facies of the genus reveals no very close relationship to any of the preceding, and seems sufficient to warrant generic separation.

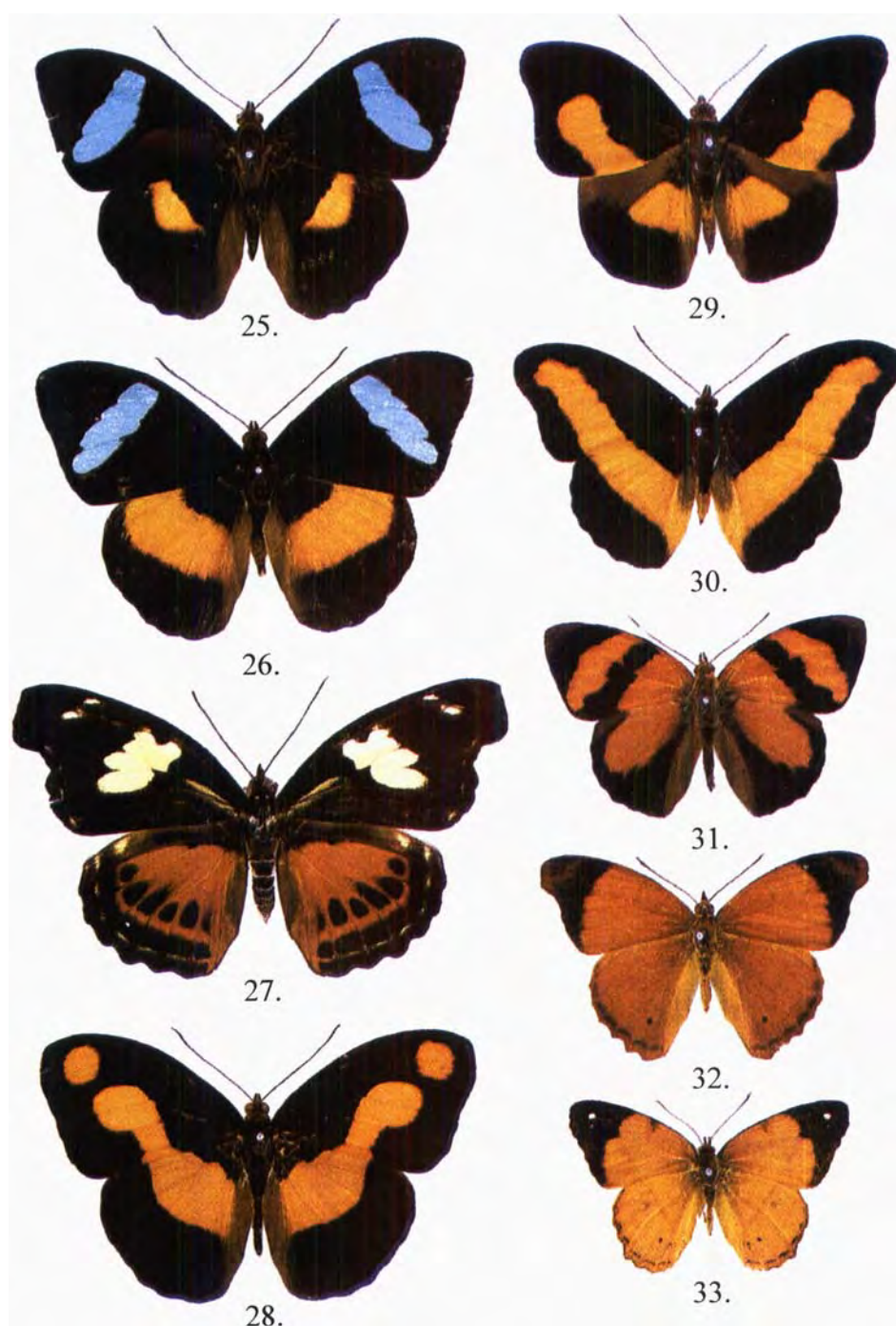


Plate 4. Fig. 25, 143785 *Nessaea batesii* (Felder & Felder); Fig. 26, 144230 *Nessaea obrina* (Linnaeus); Fig. 27, 143784 *Catonephele numilia* (Cramer); Fig. 28, 143770 *Catonephele antinoe* (Godart); Fig. 29, 143772 *Catonephele acontius* (Linnaeus); Fig. 30, 143778 *Catonephele salacia* (Hewitson); Fig. 31, 143989 *Temenis pulchra* (Hewitson); Fig. 32, 143991 *Temenis laothoe* (Cramer); Fig. 33, 144210 *Nica flavilla* Hübner.

Nica flavilla Hübner

Plate 4. Fig. 33.

49. *Nica sylvestris*, n. sp.

Met with on the Upper Amazons, from Ega to St. Paulo, in sunny places in the forest, settling on pathways.

Life history: Muysshondt, 1973c.

Host-plants: *Cardiospermum halicacabum*, *Paullinia pinnata*, *Serjania* sp. (Sapindaceae).

BMNH(E) # 144211 Holotype ♀ [*Nica sylvestris* Bates] BRAZIL U. Amazons leg. H.W. Bates Ex.

Godman-Salvin B.M. 1915-3

BMNH(E) # 144210 Syntype ♂ [*Nica sylvestris* Bates] BRAZIL U. Amazons leg. H.W. Bates Ex.

Godman-Salvin B.M. 1915-3

Genus *PERIA* Kirby

This small genus is distinguished from *Nica* chiefly by the first and second fore-wing subcostal branches being amalgamated for the greater part of their course.

Peria lamis (Cramer)

Plate 5. Fig. 40.

50. *Pelia Lamis*, Cramer

Found in the same situations as *Nica flavilla*. It has, however, a wider range, being distributed throughout the whole of the Amazons region and Guiana.

Host-plants: Sapindaceae.

BMNH(E) # 143999 ♂ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1918-4

BMNH(E) # 144000 ♂ BRAZIL Ex. Godman-Salvin B.M. 1918-4

BMNH(E) # 144001 ♀ BRAZIL Bates coll. Ex. Godman-Salvin B.M. 1918-4

BMNH(E) # 144002 ♀ BRAZIL Ega Ex. Bates B.M. 1856-111

BMNH(E) # 144003 ♂ BRAZIL Ega Ex. Bates B.M. 1857-20

Genus *DIAETHRIA* Billberg*Diaethria clymena* (Cramer)

Plate 5. Fig. 34.

51. *Callicore Clymena*, Cramer

Rather local, but abundant where it occurs; banks of the Cuparí (a branch of the Tapajos), Caiçara, and St. Paulo, Upper Amazons. It has rather a slow, sailing flight, and is attracted in numbers to moist puddles or filth on the skirts of the forest, flying when disturbed to the trees.

Host-plants: *Trema micrantha* (Ulmaceae).

BMNH(E) #144004 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1918-4

BMNH(E) #144005 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1918-4

BMNH(E) #144006 ♂ BRAZIL Rio Janeiro Bates coll. Ex. Godman-Salvin B.M. 1918-4

BMNH(E) #144007 ♀ BRAZIL Rio Janeiro Bates coll. Ex. Godman-Salvin B.M. 1918-4

BMNH(E) #144008 ♂ PERU Pebas E Peru Bates coll. Ex. Godman-Salvin B.M. 1918-4

BMNH(E) #144009 ♂ BRAZIL leg. Bates Ex. Godman-Salvin B.M. 1918-4

Genus *PAULOGRAMMA* Dillon
Paulogramma peristera (Hewitson)

Plate 5. Fig. 39.

52. *Catagramma Peristera*, Hewitson.

The males are abundant in some places, flying over and settling on filth of all kinds in the neighbourhood of huts and villages. The females I never met with, except in the shades of the forest, where they are sometimes seen in numbers on the trunks of trees.

BMNH(E) #144010 ♀ BRAZIL Villa Nova Ex. Bates B.M. 1855–44

BMNH(E) #144011 ♀ BRAZIL Villa Nova Ex. Bates B.M. 1855–44

BMNH(E) #144012 ♂ BRAZIL Villa Nova Ex. Bates B.M. 1855–37

BMNH(E) #144013 ♀ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144014 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144015 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144016 ♂ PERU Pebas Bates coll. Ex. Godman-Salvin B.M. 1916–4

Genus *CALLICORE* Hübner
Callicore eunomia (Hewitson)

Plate 5. Fig. 41.

53. *Catagramma Eunomia*, Hewits.

Found only in the interior of the country, from St. Paulo, on the Upper Amazons, to the head-waters of the rivers flowing from the north.

BMNH(E) #144017 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144018 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144019 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144020 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144021 ♂ BRAZIL leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144022 ♀ BRAZIL U. Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144023 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144024 ♂ ECUADOR Canelos Bates coll. Ex. Godman-Salvin B.M. 1916–4

Callicore cyllene (Doubleday)

Plate 5. Fig. 35.

54. *Catagramma Cyllene*, D. & H.

This species occurred sparingly in several places both on the Lower and Upper Amazons.

BMNH(E) #144030 ♂ BRAZIL S Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144031 ♂ BRAZIL S Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144032 ♂ PERU Pebas Bates coll. Ex. Godman-Salvin B.M. 1916–4

Callicore texa (Hewitson)

Plate 5. Fig. 42.

55. *Catagramma Texa*, Hewits.

Banks of the Tapajos, near the first cataracts at Itaituba.

Host-plants: *Cardiospermum grandiflorum*, *Paullinia pinnata*, *Serjania* sp. (Sapindaceae).

BMNH(E) #144033 ♂ BRAZIL Tapajos leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144034 ♂ COLOMBIA Bates coll. Ex. Godman-Salvin B.M. 1916–4

Callicore astarte (Cramer)

Plate 5. Fig. 36.

56. *Catagramma Astarte*, Cramer.57. *Catagramma Miles*, n. sp.

I met with this species at Obydos, on the Guiana side of the Lower Amazons, where it was abundant, settling on trunks of trees in the forest. *C. astarte* appears to be widely distributed in Tropical America, being found near the sea-coast of Guiana, on the Guiana side of the Lower Amazons, up to Guia, on the Rio Negro, and in South Brazil, province of Espirito Santo. It is represented by the subspecies *C. astarte miles* on the Upper Amazons. This is an abundant insect, especially near St. Paulo, where every day in the showery season numbers are seen in the village, enlivening with their bright-crimson liveries the dull, muddy streets.

BMNH(E) #144035 ♂ BRAZIL Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144036 ♀ BRAZIL Obydos leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144037 ♀ BRAZIL Obydos leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144218 Holotype ♂ [*Catagramma miles* Bates] BRAZIL S. Paulo leg. H.W. Bates Ex.

Godman-Salvin B.M. 1915-3

BMNH(E) #144045 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144046 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144047 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144048 ♀ BRAZIL L Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

Callicore cynosura (Doubleday)

Plate 5. Fig. 43.

58. *Catagramma Cynosura*, Dbldy.59. *Catagramma Amazona*, n. sp.

Equally abundant on the Upper Amazons with *C. astarte*. It continues a common insect westward as far as the slopes of the Andes, and is also found far towards the south in Bolivia. Occurred only in the swampy forests near Pará, where I saw many of the males flying at a great height around the crowns of trees. The females frequently descended to the lower bushes or to the ground. Both sexes are very wary in their movements and have a rapid flight.

Host-plants: *Paullinia* sp. (Sapindaceae), *Serjania* sp. (Sapindaceae).

BMNH(E) #144038 ♂ BRAZIL U Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144039 ♂ BRAZIL U Amazons leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144040 ♀ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144041 ♂ PERU Pebas Bates Coll Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144042 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1958-84

BMNH(E) #144043 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1958-84

BMNH(E) #144044 ♂ BRAZIL Villa Nova leg. H.W. Bates B.M. 1855-75

BMNH(E) #144219 Syntype ♂ [*Catagramma amazona* Bates] BRAZIL Para leg. H.W. Bates Ex.

Godman-Salvin B.M. 1915-3

BMNH(E) #144220 Syntype ♀ [*Catagramma amazona* Bates] BRAZIL Para leg. H.W. Bates Ex.

Godman-Salvin B.M. 1915-3



Plate 5. Fig. 34, 144004 *Diaethria clymena* (Cramer); Fig. 35, 144031 *Callicore cyllene* (Doubleday); Fig. 36, 144035 *Callicore astarte* (Cramer); Fig. 37, 144049 *Callicore excelsior* (Hewitson); Fig. 38, 144057 *Asterope sapphira* (Hübner); Fig. 39, 144016 *Paulogramma peristera* (Hewitson); Fig. 40, 143999 *Peria lamis* (Cramer); Fig. 41, 144019 *Callicore eunomia* (Hewitson); Fig. 42, 144033 *Callicore texa* (Hewitson); Fig. 43, 144038 *Callicore cynosura* (Doubleday); Fig. 44, 144222 *Antigonis pharsalia* (Hewitson); Fig. 45, 144059 *Asterope batesii* (Hewitson).

Callicore excelsior (Hewitson)

Plate 5. Fig. 37.

60. *Catagramma excelsior*, Hewits.

This most beautiful species of a beautiful genus seems confined to the interior of the continent, having been found only in the district of country lying between Fonte Boa and Nauta on the Upper Amazons. I captured the first example in an open grove near Tunantins, where it was flying from one tree-trunk to another, but was excessively wary and difficult to approach.

BMNH(E) #144221 Syntype ♂ BRAZIL Amazon leg. H.W. Bates B.M. 1857–125

BMNH(E) #144049 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

Genus *ANTIGONIS*, Felder*Antigonis pharsalia* (Hewitson)

Plate 5. Fig. 44.

61. *Antigonis Pharsalia*, Hewits.62. *Antigonis Felderi*, n. sp.

Observed at Ega; the males frequenting the moist sandy and muddy shores of the river, and mingling with the crowd of *Eunica*. Entirely replaced by *A. pharsalia felderi* at St. Paulo, 400 miles to the west of Ega. It delights to settle on the moist margins of brooks in the forest, and is of very nimble flight.

BMNH(E) #144222 Syntype ♂ [*Cybdelis pharsalia* Hewitson] BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144050 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1856–69

BMNH(E) #144051 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1856–111

BMNH(E) #144052 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1858–84

BMNH(E) #144053 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144223 Holotype ♀ [*Antigonis felderi* Bates] BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144224 Syntype ♂ [*Antigonis felderi* Bates] BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144054 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144055 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144056 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

Genus *ASTEROPE* Hübner¹*Asterope sapphira* (Hübner)

Plate 5. Fig. 38.

63. *Callithea Sapphira*, Hübn.

This most richly coloured butterfly appears to be confined in its range to the dry woods near Santarem, on the eastern side of the mouth of the Tapajos. Further westward I never saw a specimen; and to the south its area appears to be equally limited, as I did not find it further than twenty miles from the mouth of the river. It may, however,

¹ The arrangement adopted here follows Jenkins 1987, who in addition summarises the scattered available information upon early stage biology.

extend over the country to the east, that part of this region not having yet been explored. The species appears to have two broods in the course of the year, the first in October, and the second in February and March; but the first fails if the season be a dry one. In March it abounds, at least in some years, the woods positively swarming with the superbly adorned creatures, the two sexes being in about equal number, and the glowing sapphire and orange liveries imparting wonderful liveliness to the sylvan scenes. When very abundant, especially in gleamy showery weather, they issue from the woods, and are seen in the streets of the town, attracting the notice of the inhabitants. The caterpillar is armed with branched spines, two much longer than the rest rising from the head; the under surface is pale yellow, the upper black with five broad bands of vermilion. The pupa has the dorsal face of its deeply emarginate, and is of, a pale-red colour.

Host-plants: *Paullinia* sp. (Sapindaceae).

BMNH(E) # 144057 ♂ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) # 144058 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) # 144316 ♂ BRAZIL Santarem leg. H.W. Bates 776 Ex. Godman-Salvin B.M. 1916-4

BMNH(E) # 144317 ♀ BRAZIL Santarem leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

Asterope batesii (Hewitson)

Plate 5. Fig. 45.

64. *Callithea Batesii*, Hewits.

This has a wide range in the interior of S. America, being found at Ayeyros, on the Tapajos, and at Ega, on the Upper Amazons. Its habits are similar to those of *A. sapphira*, but I never found it in numbers.

Host-plants: *Paullinia* sp. (Sapindaceae).

BMNH(E) # 144542 Syntype ♂ BRAZIL Ex. Hewitson B.M. 1879-69

BMNH(E) # 144543 Syntype ♂ BRAZIL Ex. Godman-Salvin B.M. 1916-4 via Saunders Coll

BMNH(E) # 144541 ♀ BRAZIL Ega Bates H.W. B.M. 1857-20

BMNH(E) # 144059 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

Asterope markii (Hewitson)

Plate 6. Fig. 48.

65. *Callithea Markii*, Hewits.

A. markii has a wider range than the preceding, being found from Ega to the interior of New Granada, near Bogota. It is more abundant than *A. batesii* at Ega, and sometimes escapes from the forest to join the crowds of butterflies of other genera at the damp margins of water in open sunny places.

Host-plants: *Paullinia* sp. (Sapindaceae).

BMNH(E) # 144060 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) # 144061 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) # 144062 ♀ BRAZIL Ega leg. H.W. Bates B.M. 1856-111

BMNH(E) # 144063 ♂ BRAZIL Ega leg. H.W. Bates B.M. 1851-43

Asterope degandii (Hewitson)

Plate 6. Fig. 49.

66. *Callithea DeGandii*, Hewits.

I saw one example of this species at St. Paulo - this seems to be the eastern limit of its range, the examples sent to England by M. DeGand being taken a little further west in Peru.

BMNH(E) #144064 ♀ PERU Pebas Bates coll. Ex. Godman-Salvin B.M. 1916-4

Asterope leprieurii (Feisthamel)

Plate 6. Fig. 50.

67. *Callithea Leprieurii*, Feisthamel.

This is the most widely distributed species of this handsome genus, being found from the interior of French Guiana to the slopes of the Andes, in Ecuador. I met with it at many places on the banks of the Amazons, both on the north and south sides of the river. It was abundant, however, only at Obydos and Villa Nova, both of which districts lie near to Guiana. Its time of appearance in the imago-state is the months of October and November. The caterpillar is armed precisely like that of *A. sapphira*, but it is differently coloured, the dorsal surface being black, with five broad bands of a light greenish-blue tint.

Host-plants: *Paullinia* sp. (Sapindaceae).

BMNH(E) #144066 ♂ BRAZIL Villa Nova leg. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144067 ♀ BRAZIL Villa Nova leg. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144068 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

Genus *ECTIMA*, Doubleday¹⁰*Ectima thecla* (Fabricius)

Plate 6. Fig. 46.

70. *Ectima Liria*, Fabr.

Found throughout the Amazons region in company with *Colobura dirce*, and settling, like it, on the trunks of trees, but lying with its wings flat, in the manner of *Hamadryas*.

Host-plants: *Dalechampia affinis*, *D. leandrii*, *D. stipulacea* (Euphorbiaceae).

BMNH(E) #144139 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1857-20

BMNH(E) #144140 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144141 ♂ BRAZIL Bahia Bates coll. Ex. Godman-Salvin B.M. 1916-4

Ectima iona Doubleday

Plate 6. Fig. 47.

71. *Ectima Iona*, Hewits.

Rather more common than *E. thecla*; its habits are the same.

BMNH(E) #144142 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144143 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144144 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

BMNH(E) #144145 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4

¹⁰ The arrangement adopted here follows Jenkins 1985b.

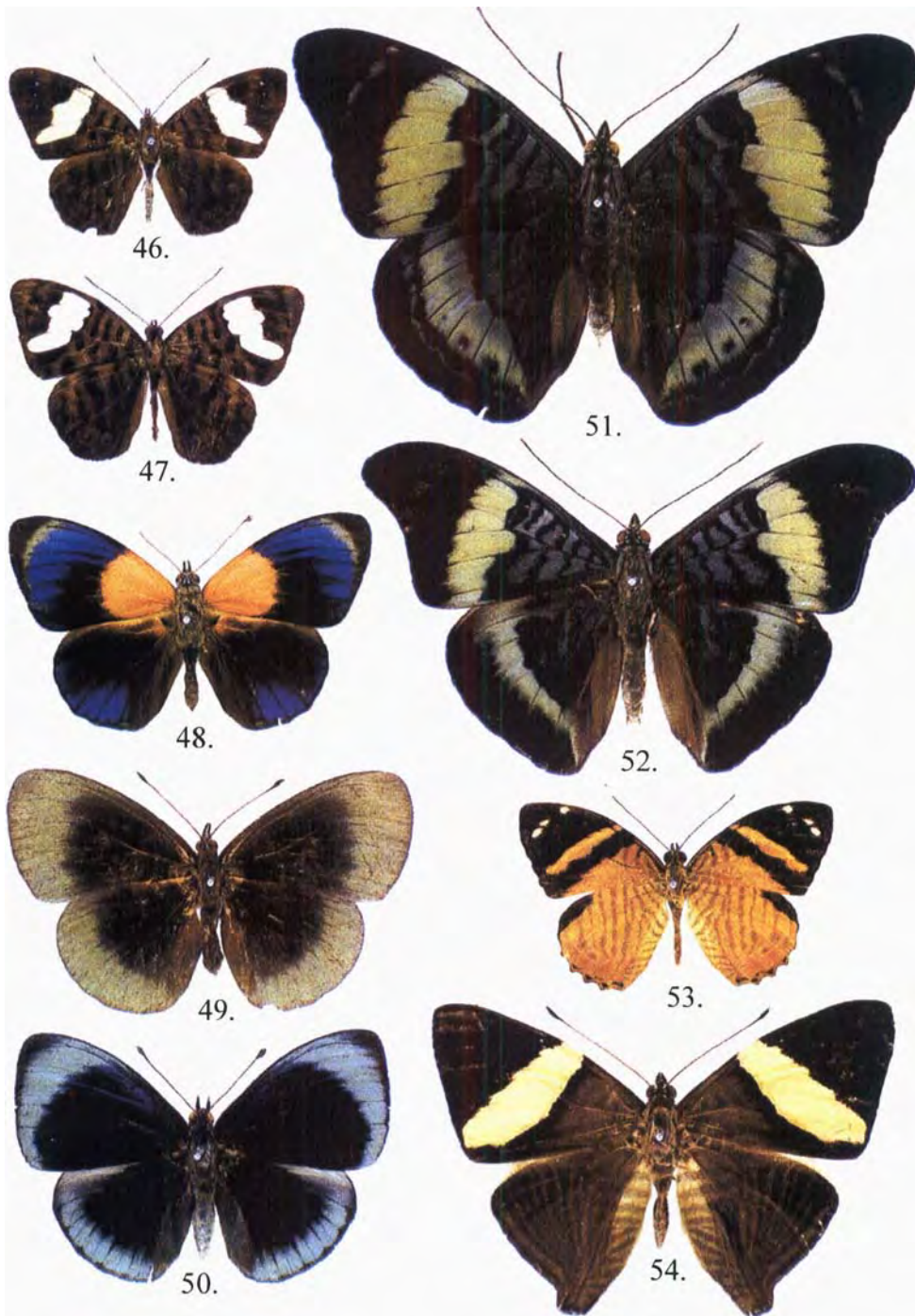


Plate 6. Fig. 46, 144140 *Ectima thecla* (Fabricus); Fig. 47, 144144 *Ectima iona* Doubleday; Fig. 48, 144060 *Asterope markii* (Hewitson); Fig. 49, 144064 *Asterope degandii* (Hewitson); Fig. 50, 144068 *Asterope leprieurii* (Feisthamel); Fig. 51, 144150 *Panacea regina* (Bates); Fig. 52, 144152 *Panacea prola* (Doubleday); Fig. 53, 144133 *Tigridia acesta* (Linnaeus); Fig. 54, 144308 *Colobura dirce* (Linnaeus).

BMNH(E) #144146 ♀ BRAZIL Villa Nova leg. H.W. Bates Ex. H.W. Bates B.M. 1855–37

BMNH(E) #144147 ♂ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1850–4

BMNH(E) #144148 ♀ BRAZIL Para leg. H.W. Bates Ex. H.W. Bates B.M. 1852–14

Genus *PANACEA* Godman & Salvin

Panacea prola (Doubleday)

Plate 6. Fig. 52.

72. *Pandora prola* Dbldy.

This superb insect was first found in New Granada, on “Mount Tolima.” In the Amazons region it inhabits the moist and lofty forests of the plains, but only in the western portion of the region towards the Andes, commencing at the village of St. Paulo de Olivença. It descends into sunny openings, and into open grounds on fine days, entering the houses in villages, and settling on the whitewashed walls, with its wings sometimes expanded and sometimes erect. Its flight is extremely rapid and bold. Dr. Felder has received it from the Upper Rio Negro; so that its range comprises a large area under the equator to the east of the Andes, but near their eastern slopes.

Life history: Montoya, 1989 (probably applicable to this species).

Host-plants: *Caryodendron orinocense* (Euphorbiaceae).

BMNH(E) #144151 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144152 ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

Panacea regina (Bates)

Plate 6. Fig. 51.

73. *Pandora regina*, n. sp.

This magnificent insect only occurred once, namely, at St. Paulo, in a sunny nook in the forest, where I found it settled on the trunk of a tree, wings erect.

Host-plants: *Alchornea costaricensis*, *Plukenetia penninervia*, *P. volubilis* (Euphorbiaceae).

BMNH(E) #144150 Holotype ♂ BRAZIL S. Paulo leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

Tribe Coeini

Genus *TIGRIDIA* H bner

Tigridia acesa (Linnaeus)

Plate 6. Fig. 53.

68. *Callizona Aceste*, Linnaeus.

The insect is a common one in the Amazonian forests, and is always found about the trunks of trees, settling frequently on the bark, with its wings held in a perpendicular position. It is also found in Guiana and Venezuela.

Life history: Young, 1986.

Host-plants: *Cecropia obtusifolia*, *Coussapoa aeifolia*, *Pourouma bicolor* (Cecropiaceae). *Ficus* sp. (Moraceae).

BMNH(E) #144132 ♂ ECUADOR Bates coll. Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144133 ♂ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144134 ♀ BRAZIL Para leg. H.W. Bates Ex. Godman-Salvin B.M. 1916–4

BMNH(E) #144135 ♀ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4
 BMNH(E) #144136 ♂ BRAZIL Ega leg. H.W. Bates Ex. Godman-Salvin B.M. 1916-4
 BMNH(E) #144137 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1857-20
 BMNH(E) #144138 ♀ BRAZIL Ega leg. H.W. Bates Ex. H.W. Bates B.M. 1857-20

Genus *COLOBURA* Billberg

Colobura dirce (Linnaeus)

Plate 6. Fig. 54.

69. *Gynecia Dirce*, Linn.

Found in the same situations as *Tigridia acesta*, settling on the trunks of trees in the same way. It appears to have a wider range, being found as far north as Guatemala and Honduras, and in the West India Islands. [Now believed to comprise two sympatric barely distinguishable species, at least with regard to the adult butterfly (Willmott, pers. comm.). The correct associations of the historical biological data remain problematical.]

Life history: Muysshondt & Muysshondt, 1976.

Host-plants: *Cecropia hololeuca*, *C. obtusa*, *C. obtusifolia*, *C. pachystachya*, *C. peltata* (Cecropiaceae).

BMNH(E) #144308 ♂ BRAZIL Para L. Amazon Ex. Godman-Salvin B.M. 1916-4 [no data attributing it to Bates.]

Continued in Bates, 1865, *Journal of Entomology* 2: 311.

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Book Review

The Quest for Food: Its Role in Human Evolution & Migration, written and illustrated by Ivan Crowe, Tempus, 2000, ISBN 0 7524 1462 3, Price £25.00.

As a sociologist with a modest background in the natural and biological sciences, I approached this very remarkable book from the vantage point of someone concerned with the relationships between societies and their natural environments. Now a major theoretical input to sociology was for a long time provided by Marxism, but I am not speaking here of its commitments to social revolution, nor of its utopian assumption that Socialism must ultimately be the solution to humanity's main problems. Rather, because Marxism long provided the only real attempt at a comprehensive theory of the functioning and developmental principles of society, it is worth considering here its perspective on the human quest for obtaining food. Many of the insights provided by Ivan Crowe in his book, and the way he deals with the vast topic treated in *The Quest For Food: Its Role in Human Evolution and Migration* can be helpfully viewed in this light. Central issues can be fruitfully considered through the lenses of this theoretical framework, although Crowe does not explicitly refer to it.

Obtaining food is, in Marxist terminology and for the Marxist conceptual framework, part of 'production'. It represents the most basic and ultimately the most important sphere of production in any given society, even one in which the majority of producers are no longer directly engaged in it – that is, in 'industrial' and 'post-industrial' societies. For Marxism, human hunting and gathering are forms of production, not merely procurement, as they always involve tools and technologies, or 'means of production' (projectile points, choppers, cutting flints and sickles, bows and arrows, spears etc. as well as baskets, pots, grinding mortars and so on). And they always involve human intelligence, planning, calculation etc., activities which take place in specific, variable ways within particular societies. 'Forms consciousness', and specific 'social relations of production', as well as specific 'means of production', are inevitably involved, and these constitute conditions of existence unique to the human species

A core concept within Marxism which allows these ideas to be grasped is that of 'mode of production', a particular form or forms of which predominate within any given 'social formation'. Complex 'dialectical' interactions between the various 'levels' of social activity – the economic, political, and ideological levels especially – explain and exemplify the functioning and development of that particular social formation.

At the core of Ivan Crowe's book lies the issue of how food production – in this Marxist sense – has interacted with, influenced, and been influenced by: the growth of human intelligence, physical and physiological developments in phenomena ranging from the human sense of balance in space to the growth of manual dexterity, from the optics of the human eye to the means of creating speech, and to the size of the brain itself. All these were necessarily implicated within cultural and intellectual advances, from ritual, to communication within and between groups, and to art; and these were all embedded within the ways societies recognized and understood cycles in nature – ranging from the seasonal appearances of particular flora and fauna to the movements of the

celestial bodies. All these latter phenomena have been treated within Marxism as 'forms of consciousness' or 'ideology.'

But more deeply than 'historical materialism', which is the term Engels gave to Marx's research methodology and theoretical framework, this book by Ivan Crowe grasps the societal processes involved in the development of humanity as happening within 'nature', or the 'natural environment'. This is done in a way that allows interacting social and natural processes (the latter including the properties of stone, wood, and other important non-living natural resources; climate and ecosystem changes; the facts of human digestion and metabolism; the evolution of other relevant living organisms and the characteristics of other crucial plants and animals besides Man), to be understood as a single, though vastly complex, interactive, dynamic set of structural processes. Thus and only thus, can the emergence, development, and present predicament of *homo sapiens sapiens* be properly understood.

There is no doubt left by the account given by Crowe – and with this Marxism would agree – that the production of food has been the single most important level of human activity or practice in the evolution of our species. This has remained true even with the development of society into its 'modern', 'manufacturing', 'industrial', and now 'post-industrial' phases. But of course, the production of food, or 'the quest for food', implicates and is implicated in all other levels of human, social activity – from 'lifeways' and lifestyles, to tool production; from culture, language, and art, to politics. Thus, the history of the human 'quest for food', entails in a certain sense the whole history of humanity. A complex philosophical and interpretative problem lies in how to reckon with this paradoxical admission that one level out of a complex of interacting levels is most important, dominant, or determinant, yet at the same time accepting that all levels are implicated or entailed in all other levels; since there is ultimately only one unified, unitary totality of human, social existence.

There is no point in trying to summarise a book which is as rich in facts and detailed discussions of very varied phenomena, as is this one. Besides, few of the individual facts or theoretical conclusions to be found in the book are in themselves wholly new: It is in its synthesis, its overall arrangement of vast quantities of relevant data and ideas that its strength lies. It is a book that taps deeply into the fundamental realities of human existence, setting off reverberations and resonations into areas of thought which are dealt with sometimes relatively little, at least explicitly, in the text.

TIM CLOUDSLEY
Glasgow Caledonian University

Programme

2002

- 11th January 6pm Swinscoe Memorial Lecture
Prof. David Richardson
REFLECTIONS ON LICHENOLOGY: ACHIEVEMENTS AND
CHALLENGES OVER THE LAST FORTY YEARS
With the British Lichen Society
- 11th January Sixth Form Meeting in Dublin
WHO OWNS YOUR GENES:
GENETICS, GENOMICS AND ETHICS
† Miss Mary Griffiths FLS
- 17th January 6pm FOSSIL MOLLUSCS
† Dr Richard Preece
With the Malacological Society of London
- 24th January 6pm THEIR JAWS IN YOUR SKIN
Dr John Maunder
- 7th February 6pm* POISONOUS PLANTS AND FUNGI
Dr Elizabeth Dauncey FLS
- 21st February 6pm SITONA spp: DISTRIBUTION AND EFFECTS ON THE PLANT
Dr Phil Murray
- 4th April 6pm HOW DO WE TRAIN THE NEXT GENERATION
OF FIELD BOTANISTS?
† Dr Franklyn Perring OBE FLS
With the Botanical Society of the British Isles
- 11-12th April INTRACLONAL GENETIC VARIATION: ECOLOGICAL AND
EVOLUTIONARY ASPECTS
† Dr Gagan Lushai and Dr Hugh Loxdale
With the Royal Entomological Society
- 19-20th April INVERTEBRATE CONSERVATION IN THE UK AND
ITS OVERSEAS TERRITORIES
† Dr John Edmondson and Dr Sara Oldfield
With Flora and Fauna International
- 27th April Joint One-day meeting with the British Ecological Society
title to be announced
- 8-10th May ROBERT BROWN 200
† Prof David Mabberley
With and at the Royal Botanic Garden, Sydney
- 24th May 5pm* ANNIVERSARY MEETING

Unless stated otherwise, all meetings are held in the Society's Rooms.

For further details please contact the Society office or consult the website – address inside the front cover.

* Election of Fellows

† Organisers

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