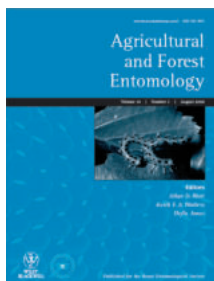


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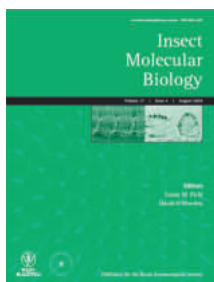
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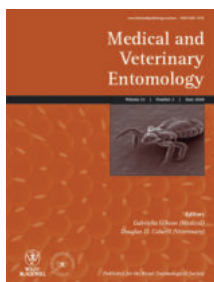
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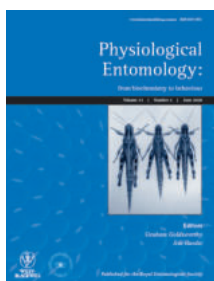
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COVER PICTURE

Image of a Burnet moth from Dick-Vane Wright's 'Brilliant Burnetology' (a review of 'The Natural History of Burnet Moths (Zygaena Fabricius, 1775) (Lepidoptera: Zygaenidae). Part 1').

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EDITORIAL



Hello and welcome to *Antenna* 42(4). I'm typing this issue's Editorial fresh from the *Antenna* Annual Meeting at RES HQ, Mansion House, held in early October. This is always an enjoyable and productive event, even more so this year thanks to our being joined by RES President, Prof Chris Thomas. This was also the first yearly *Antenna* gathering with Richard at the helm, and a great opportunity to hear how busy he's been since joining the team as Editor, encouraging copy and generating a multitude of exciting ideas for future content. As many of you will know, Richard has also been active recently launching his new book, 'The Butterfly Collection', a selection of poetry with our native UK butterflies as the subjects.

Though I've yet to pick up a copy, Peter Smithers' review at the back of this issue certainly suggests it's worth doing so, describing 'The Butterfly Collection' as a '*fusion of the arts and sciences that have been blended with a large dose of the author's wit and obvious love of his subject. It is a celebration of the beauty and diversity of our butterflies that will be loved and cherished by all who read it.*' This issue also includes a number of additional book reviews from Peter, as well as an extensive appraisal of 'The Natural History of Burnet Moths (*Zygaena Fabricius*, 1775) (Lepidoptera: Zygaenidae), Part 1' by Axel F. Hofmann & W. Gerald Tremewan, gratefully received from Dick Vane-Wright.

In addition to being the subject of several Book Reviews, the Lepidoptera are also the focus of both of this issue's main articles. The first of these is a short piece focusing on observations by the authors (Chew MY & Phon C-K) of 'A butterfly-attracting common strangling fig (*Ficus sundaiica*) in the Tasik Chini riverine forest in Peninsular Malaysia'. The second, equally as exotic in terms of geography, is a paper from Manish Bhardwaj and V. P. Uniyal considering the diversity and distribution of 'Butterflies of the Sacred Gangotri Landscape in Himalaya'.

This issue also features a packed Society News section to keep you entomologically entertained over the holiday season, with a look back at recent meetings and entomological events. Butterflies feature here too, most notably at the RES Insect Conservation SIG, which was run jointly this year with the Swallowtail and Birdwing Butterfly Trust in my own home county of Norfolk. Other insect Orders also abound in this issue's Society News though, with a report from the RES Eastern Regional Meeting at Foxearth Meadows, which is managed with a specific emphasis on Odonata, and everything entomological on the table of the RES stand at this year's Big Bang Science Fair in Birmingham. We also feature a report on the recent Insect Rearing SIG, and a post-visit piece from the ESA, 2017. As ever, we also feature our usual Correspondence, Meetings Diary and Schedule of New Members and Fellows, as well as details of a selection of RES awards and entomological merchandise that can be purchased from the Society's online shop.

Finally, I'd like to take the opportunity to draw attention to a couple of key updates to *Antenna*'s 'Guide for Authors' (later in this issue). Firstly, I'm pleased to report that we are now able to receive 'Supplementary Material' with submissions to *Antenna*. If accepted for publication, this would then appear on the secure 'members only' area of the new RES website. Secondly, I'd also like to mention that, as our author guidance now attests, we're keen to encourage relevant App and Website appraisals to appear alongside our more traditional Book Reviews. So, should you stumble upon a particularly good online entomological resource that you'd like to share, or should you have created an App that you'd like us to look at, please do get in touch via the *Antenna* email.

Wishing you all a happy holiday season,
Dave



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To maintain a high quality we suggest that submissions for *Antenna* be presented via e-mail or on CD. Files must be in a PC-compatible format preferably in MS Word.

Electronic images can be embedded in the Word document but we will also require separate electronic images. These should be the full size image (.jpg or .tiff) from the camera even after the author has edited the file.

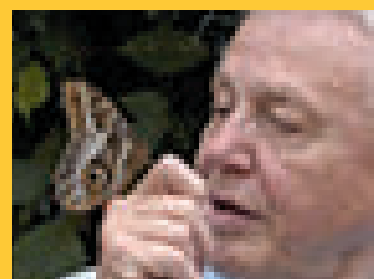
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If an image is intended for the front cover then the photograph should be in **portrait format** and again should be the full size image from the camera even after the author has edited the file.

To give an idea as to what happens when the image is not of sufficient size, take a look at these two photographs. One is 300dpi and the other is 72dpi.



300dpi



72dpi

CORRESPONDENCE

Verrall Supper Bursaries for 2019

From the “*van Emden Bursary Fund*”, the Entomological Club will award up to three bursaries to registered students and other early-career entomologists in connection with the Verrall Supper on Wednesday 6th March 2019. The aim of the scheme is to introduce to the Verrall Association promising young entomologists who are likely thereafter to wish to continue their membership themselves. A bursary funds a one year membership of the Association and the Supper, as well as up to £40 of any travelling expenses incurred. Perhaps more importantly, the award recognises merit and therefore could add to the impact of a CV.

Proposals for bursaries must come from academic supervisors or other relevant managers with some standing in entomology, and proposals should be submitted to entclub@yahoo.co.uk by 10th February 2019.

There is no prescribed format for proposals. One side of A4 may well be enough, and the following list gives guidance as to what might be included:

- Name, date of birth, postal and e-mail address of person proposed.
- Subject of research study or other entomological work, stage reached, source of funding and achievements so far, evaluation of future promise.
- Any evidence of interest in entomology at an earlier age and any previous practical involvement.

Helmut van Emden
The Entomological Club
(www.entomologicalclub.org)

Special Issue

As I'm sure you are all aware, the Society publishes seven peer-reviewed Journals and it would be good if, as Members and Fellows, you could consider them as a vehicle for publishing your research. They are well-respected, covering a very wide range of entomology and the details of them can be found inside the front cover of each issue of *Antenna*. To foster closer links with the membership, Journal Editors will now take it in turns to write a short piece for each issue of *Antenna*, highlighting an interesting paper or Special Issue, or anything else the Journal is currently exploring. Please take time to read these if you can.

I'm sure that the Editors would also welcome input from you in the form of suggestions for Special Issues, offers of a review paper or just comments on the content of the Journal. These can come either via me (lin.field@rothamsted.ac.uk) or to the Editors themselves (details below). It's in all our interests to support the Journals as much as we can as they provide the income for many of the Society's activities and play a key role in the Society's aim of 'dissemination of entomological research'.

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Professor Lin Field
Editorial Officer, Royal Entomological Society



Fig. 1. The flooded riverine forest of the Chini River.

Photo by M. Y. Chew

A butterfly-attracting common strangling fig (*Ficus sundaica*) in the Tasik Chini riverine forest in Peninsular Malaysia

19th January 2018, 10 am. The sunny weather was a nice break from a rainy period that had lasted for more than a week, and which had contributed to the high flood water that inundated the riverine forest along the Chini River that flows out of Chini Lake, locally known as Tasik Chini (Fig. 1). Many riverine trees were laden with flowers or fruits, including the strangling fig, *Ficus sundaica* (Fig. 2).

Approaching the fig tree on the inundated bank of the river that reaches about 7 m high, butterflies were seen flying in the crown. From afar, we thought it was a tree in bloom and that the butterflies were attracted to the nectar-producing flowers. Upon closer examination, it was evident that the butterflies were attracted to the overripe, juice-oozing fruits, especially

the damaged ones, plausibly partially consumed by birds (Fig. 3). Three butterfly species were observed and photographed from a distance, namely the clipper (*Parthenos sylvia lilacinus*), and possibly the elegant emperor (*Eulaceura osteria kumana*) and the common palmfly (*Elymnias hypermnestra agina*). All these species belong to family Nymphalidae. An estimated total of 10–30 individuals, of which more than 90% were the clippers, were within the vicinity of the fig canopy during the observation period of half an hour. Herbarium specimens of the fig (Fig. 4) were taken for species confirmation.

Ficus sundaica (Fig. 5), family Moraceae, is a strangler with a wide distribution in Southeast Asia from the Andaman and Nicobar Islands

M. Y. Chew¹ & C.-K. Phon²

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Fig. 2. The strangling fig, *Ficus sundaica*.

Photo by M. Y. Chew



Fig. 3. Damaged fruit on the strangling fig, *Ficus sundaica* attracted the butterflies.

Photo by S. M. Woo



Fig. 4. Specimens of the fig were taken for species confirmation.

Photo by M. Y. Chew

(Chaudhary *et al.*, 2012), Assam to Indochina, Java and Borneo (Kochummen, 2000). In Peninsular Malaysia, it is a common strangler that begins life as an epiphyte, but with age is capable of developing into an impressive stilt-rooted tree with vast spreading crown. The species has been recorded as food for birds (Lee *et al.*, 2002) including barbets, *Psilopogon* and *Caloramphus* spp. (Phillipps & Phillipps, 2016), brown-backed flowerpecker, *Dicaeum everetti* (Lau *et al.*, 2012), helmeted hornbill, *Buceros vigil* (Hadiprakarsa & Kinnaird, 2004), and arboreal mammals (Lambert, 1990), including langurs (*Presbytis* spp.), squirrels (*Callosciurus* spp.) and orangutans, *Pongo pygmaeus abelii* (Rijksen, 1978), even before it is ripe. In Sumatra, the species was recorded to show a recurrent fruiting pattern, even during the wettest period (Rijksen, 1978).

The nutrient content of the *Ficus sundaica* fruit is unknown. In other fig species, e.g. *F. carica*, the sugar content is dominated by fructose and galactose with a total sugar concentration around 20% (Ersoy *et al.*, 2007). Minerals were reported from the fruits of nine *Ficus* species, included sodium, potassium, calcium, chromium, manganese, magnesium, iron, copper and zinc (Khan *et al.*, 2011). The fruits of *F. cunia* contain small amounts of alkaloids (Chhetri *et al.*, 2017). Some figs also contain a very small amount of protein and nitrogen (Thomas, 1984).

The clipper (Fig. 6) occurs in the lowlands of Peninsular Malaysia and southern Thailand (Kirton, 2014). It is quick on the wing and glides fast. It normally rests with wings open and is usually seen in bushy clearings close to the forest. Although it can be found throughout Peninsular Malaysia, it occurs locally in certain habitats. It has a forewing length of about 4.5 cm (Kirton, 2014). It is distinguished from the other butterflies by the black ground-colour on the upperside of its wings and the blue and green lines and stripes. The forewings consist of a post-discal series of large, white, hyaline spots (Corbet & Pendlebury, 1992). This butterfly species is a common visitor to the *Lantana* flowers and sometimes feeds on wild fruits such as *Melastoma malabathricum* (Chong CY, pers. comm.). It is also recorded to take both nectar and fruit juice and in



Fig. 5. *Ficus sundaica*, family Moraceae.

Photo by S. M. Woo

captive experiments is attracted to reddish hues (Sourakov *et al.*, 2012). The males sometimes puddle on moist ground. The nectar of *Lantana camara* consists of hexoses (glucose and fructose) and sucrose, where the hexoses dominate over sucrose (Torres & Galetto, 2014). Other nutrient content is unexplored. It is postulated that the hexoses (including fructose and galactose) in fig fruits are one of the attractants of the clippers that visit the strangling fig at Tasik Chini.

Ficus is generally regarded as an important food source in the forest. It is sometimes dubbed “the single most important wildlife food source”, where wildlife populations are higher in areas with greater densities of large strangling figs (Van Schaik, 1996; Dew & Boubli, 2005). Its unique, often

obligate, symbiotic relationship with fig wasps (Cook & Rasplus, 2003; Farache & Rasplus, 2015) is also well known. The leaves of some fig species are host to butterfly larvae, e.g. *Ficus indica* for the striped blue crow (*Euploea mulciber mulciber*) (Corbet & Pendlebury, 1992), *Ficus ischnopoda* for the map-wing (*Cyrestis* spp.) (Igarashi & Fukuda, 1997) and fallen, rotting *Ficus auriculata* figs were recorded to attract the archduke *Lexias pardalis* butterfly (Shihan, 2016). Besides wasps and butterflies, fruit-fall beetles also depend on figs for food and sometimes oviposition sites (Borcherding *et al.*, 2000). Nonetheless, observations of clippers and other understory butterflies feeding in the fully exposed canopy of a strangling fig are a rare sight.

Acknowledgements

The field trip was funded by the Ministry of Natural Resources and Environment (NRE) through “the rewilding of *Utricularia punctata* into Lake Chini as a model of threatened aquatic species conservation of wetland” project with strong support from the Pahang State Forestry Department and Pahang State Economic Planning Unit. Gratitude also goes to FRIM’s zoologist M. Kaviarasu for bird and mammal Latin name confirmations, Dr L. G. Kirton for butterfly identification confirmation, Dr R. Kiew for commenting on the text, C. Y. Chong for sharing his field observations on clippers, N. L. Liew for contributing the clipper photo and observations of clipper’s behaviour in the field and volunteer photographer S. M. Woo.



Fig. 6. The clipper occurs in the lowlands of Peninsular Malaysia and southern Thailand.

Photo by N. L. Liew

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Figure 1. Gomukh.

Butterflies of the Sacred Gangotri Landscape in the Himalaya

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The Himalaya is the world's largest mountain complex, a meeting point of major biogeographical zones, and is a global biodiversity hotspot important for conservation. Extending along the northern fringe of the Indian subcontinent, from the bend of the Indus river in the northwest to the Brahmaputra river in the east, the Himalaya affects the life and livelihood of over 300 million people. The state of Uttarakhand also forms part of this complex Himalayan mountain system and is located in the northern part of the Indian subcontinent, sharing international borders with Tibet and China. Uttarakhand falls in what is termed the biogeographic province 2(B) of the Western Himalaya (Roger & Panwar, 1988). The mountains of Uttarakhand play a key role in supporting the economy, through hydropower, water supply, horticulture, agriculture and tourism. The state also holds significant biological, socio-cultural





Figure 2. Nilang Valley

and ecological wealth. It is, however, also prone to natural disasters like flash floods, cloud bursts, earthquakes and landslides. A lake burst event in Kedarnath in 2013, due to unexpected heavy rain, is an example of one such disaster, taking thousands of lives and devastating the biodiversity of Kedarnath valley all within a few minutes.

An inventory of biodiversity is of primary importance as part of biodiversity conservation efforts and for sustainable development, particularly in threatened and fragmented landscapes like the Western Himalaya, which harbour a unique assemblage of flora and fauna of considerable conservation importance. In comparison with higher plants and larger animals, the inventory of insects in the Western Himalayan landscape is still fragmented and incomplete.

Gangotri Landscape

The Gangotri landscape is an important habitat for high altitude biodiversity in the Western Himalayan region. The area represents large variation in altitude (from 900m to over 6,000m), with a gradient of disturbance regimes from pristine natural Himalayan forests to highly disturbed villages and agricultural lands. Three protected areas (Gangotri National Park, Govind National Park and Govind Wildlife Sanctuary) lie within the current study area. Gomukh,

an important holy shrine for Hindus and the source of river Ganges, is in Gangotri National Park and is visited by large numbers of pilgrims (Fig. 1). Gangotri National Park is accessible through two valleys, *viz.* Gangotri and Nilang valley (Fig. 2) and is also visited by large numbers of international tourists for adventure, trekking, camping, mountain climbing, and for spiritual purposes. Despite being home to important high altitude biodiversity, there have been very few scientific studies conducted in the landscape.

Butterflies as indicators

To select and prioritise areas for biodiversity conservation, assessments of diversity and distribution patterns of indicator taxa can be an important, helpful and a cost-effective alternative to generation of more expansive species inventories. By focusing on one biodiversity indicator taxon a large amount of money and time can be saved, and this can be a valuable tool in conservation planning. Several taxa have been tested for their utility as indicators. Butterflies have been suggested as potential indicators of habitat fragmentation and disturbance, and have been successfully tested as surrogate taxa to reflect biodiversity in other taxa as well. Several features of the butterflies make them good candidates for us as indicators, in addition to their potential as

charismatic umbrella and/or flagship species. They fulfil many of the criteria proposed to define useful study groups: they have short generation times, are day-flying, diverse, and usually easily identifiable. Furthermore, butterfly taxonomy, distribution, and natural history are better described than many other insect taxa (Vane-Wright & Ackery, 1984).

Keeping this in mind, we studied patterns and processes involved in shaping diversity and distribution of butterflies along elevational gradients in the Gangotri landscape from 2008 to 2011. We sampled four vegetation types, *viz.* mixed riparian and scrub forest, pine forest, broad leaved forest, conifer and alpine forest. Butterfly species richness, abundance and microclimatic data were collected.

Butterfly diversity and composition

A total 189 species of butterflies were recorded, representing 92 genera and 5 families. Analysis suggested that the inventory was almost complete at a regional level (96%). The most abundant species was *Pieris canidia* (503 individuals), and most individuals were recorded in mixed riparian and scrub forest (201 individuals). The highest numbers of species were recorded in mixed riparian and scrub forest, and the lowest in pine forest (Fig. 3).

Comparison of different habitats showed that, on average, species and composition of habitat type was more similar within than among different habitats (Fig. 4). Analysis showed that the greatest differences occurred between mixed riparian scrub forest and pine forest, and mixed riparian scrub forest and conifer and alpine forest. The greatest differences in family

composition occurred between sites of pine forest and mixed riparian and scrub forest, with the families Lycaenidae and Nymphalidae contributing most to group differences between pine forests and mixed riparian and scrub forest. Species of family Nymphalidae generally prefer canopy forest with good moisture availability, while species of the family Lycaenidae were found in

patches comprising considerable diversity of flowering herbs and shrubs; both such conditions are absent in pine forests. The generalist species observed were Large Cabbage White, Common Brimstone, Indian Cabbage White, Indian Tortoiseshell, Pioneer, Spotless Grass Yellow, Pale Grass Blue, Common Emigrant, Common Copper, Indian Red Admiral, Plain Tiger and Painted Lady.

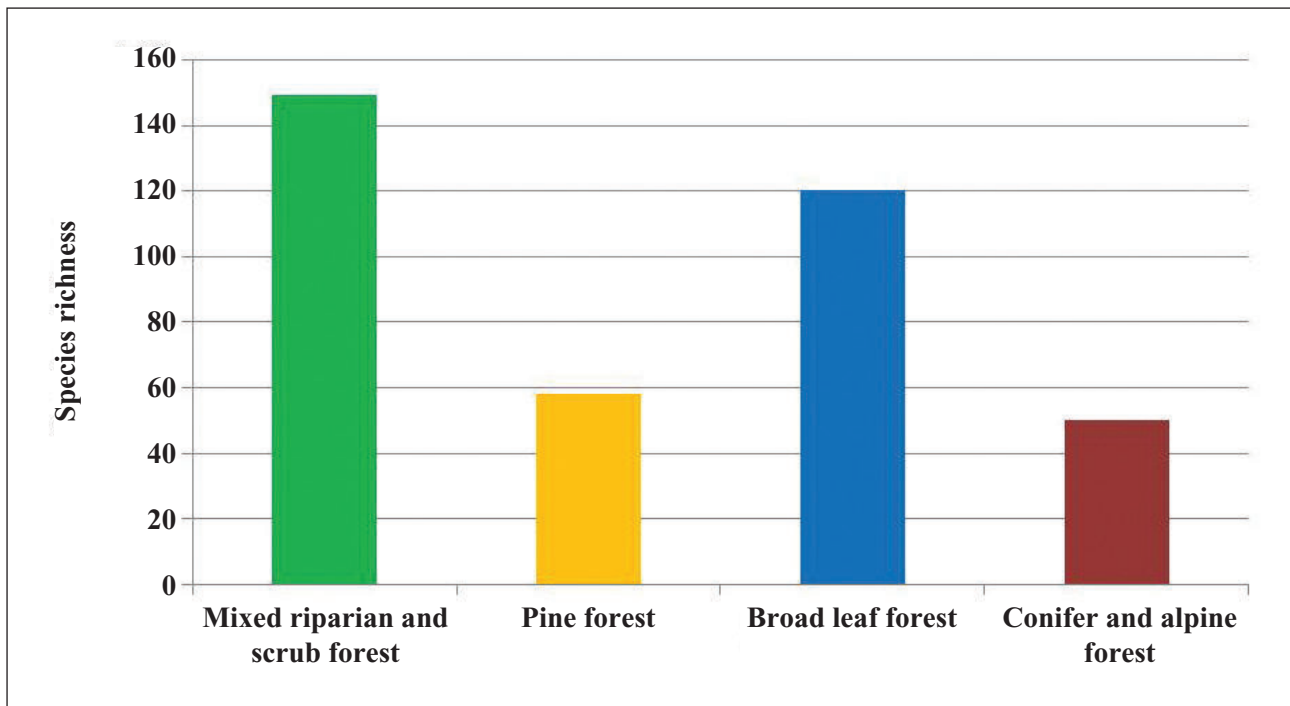


Fig. 3. Butterfly species richness in different habitats.

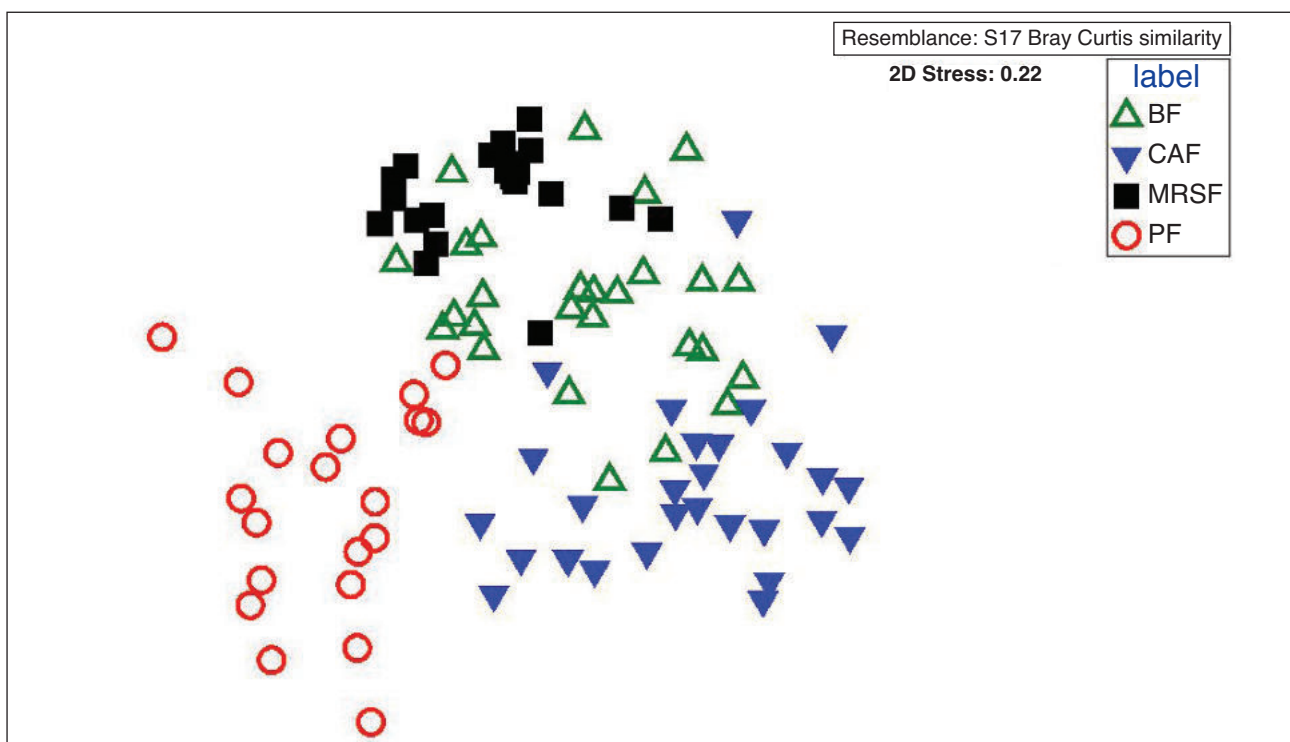


Fig. 4: Multi-Dimensional Scaling plot showing butterfly composition of habitat type was more similar within than among different habitats. BF = Broad leaf forest, CAF = Conifer and alpine forest, MRSF = Mixed riparian and scrub forest, PF = Pine forest.

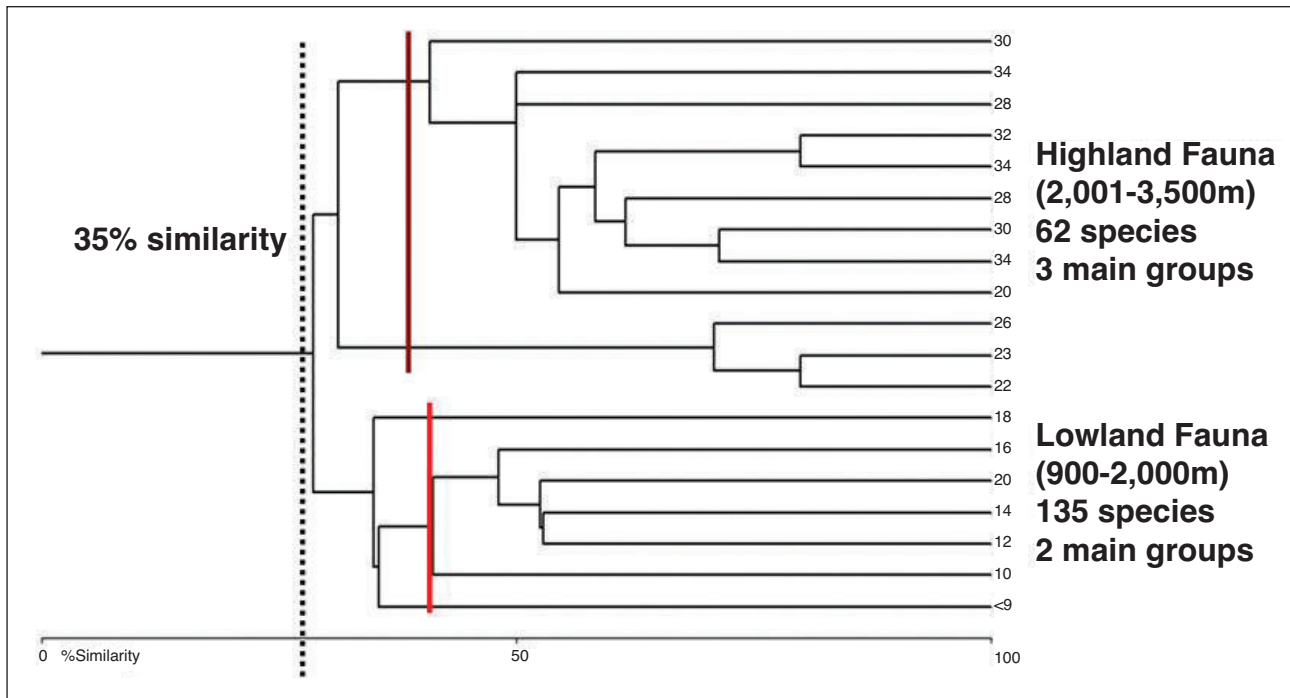


Fig. 5: Two major butterfly assemblage groups structured by altitude.

Role of altitude in shaping butterfly assemblages

Altitude was found to play a major role in governing butterfly composition. Results showed that two major assemblage groups of butterfly (highland and lowland) were found to be structured by altitude (Fig. 5). At a plot level, environmental variables like temperature, plant species richness, shrub and herb density and canopy cover were the main positive predictors of butterfly species diversity, while elevation, relative humidity and disturbance (fire and livestock abundance) variables showed negative relationships to butterfly diversity. Our study also offered support for the 'water energy balance' hypothesis of species richness gradients, which states that the temperature limits the number of species at higher altitude, and rainfall determines species richness at warmer, lower altitudes.

Seasonal patterns were also examined. In general, the main peak in diversity of butterflies was observed at the end of the summer season (dry season) with a second peak in the monsoon season (wet season), while the highest abundance was recorded at the end of wet season. The most abundant butterfly family was Nymphalidae, accounting for more than half of the total individuals of butterflies. Nymphalidae also accounted for the highest number of species occurring every month during the year. Butterfly

composition was found to be significantly variable across summer, monsoon and winter seasons, as well as between natural and disturbed sites when grouped separately. Butterflies were seen in congruence at sites where water was available in the landscape at the end of dry season (late May and early June).

Findings

Approximately 9.5% of total species (189) which were recorded from the landscape were listed in the Indian Wildlife (Protection) Act (1972). In conclusion, we observed that despite conducting our survey over a restricted geographic range, the landscape was able to support a high level of butterfly diversity, and that the processes associated with landscape heterogeneity were strong enough to support a unique butterfly assemblage between forests (Fig. 6). Despite enormous pressure from the local communities on these habitats, they supported a considerably high (around 40-50% of the butterfly species expected to be found in Uttarakhand state) butterfly diversity in a relatively small area. This region, along with three protected areas, is important for long term conservation of biodiversity in Gangotri landscape in Western Himalaya.

There have been very few studies on the biogeography and distribution of

the Himalayan butterfly fauna during past decades (Mani, 1986). As the forests in the Himalaya are under significant threat from human-induced forest fragmentation and habitat degradation, there is an urgent need for biodiversity studies, especially for taxa which are endemic to the Himalayan region. We expect that results presented and discussed here will help conservation planners and managers by aiding them in the selection of biodiversity rich areas and use of indicator taxa, which will boost biodiversity conservation efforts in the Himalaya.

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Common Blue Apollo.



Yellow Swallowtail.



Blue Admiral.



Indian Awlking.



Narrow Banded Satyr.



Sorrel Sapphire.

Fig. 6: Some butterflies reported from Gangotri landscape.

Society News

Eastern Region Meeting (in Association with A Rocha UK)

Clare Town Hall, Essex
12th July 2018

Alvin Helden



Attendees watching dragonflies and damselflies at one of the ponds at Foxearth Meadows Reserve. Photo: Alvin Helden

Foxearth Meadows, which is managed with a specific emphasis on Odonata, was the focus of this joint meeting. Foxearth Meadows is a small nature reserve in Essex, just inside the border with Suffolk. It is owned by the Christian conservation organisation, A Rocha UK, who opened it to the public in May 2017.

The meeting was divided into a morning session of talks with the theme of insect conservation on small nature reserves. We used the title, 'Starting Small, Aiming Big – Insect Conservation on local nature reserves'.

The meeting was begun by Alvin Helden, who first introduced the Royal Entomological Society and then gave a summary of his work from his various studies into the effects of grassland management on invertebrates and how his findings can be applied to the small nature reserve context. This was followed by an introduction to A Rocha UK from the Foxearth Meadows reserve manager, Mark Prina.

After some excellent mid-morning refreshments, we had three more talks. Guy Manners, representing Butterfly Conservation, gave us an insight into

how his organisation has been able to gather data to show changes in butterfly and moth numbers in the UK. He then went on to relate the role that local reserves may have in their conservation and what species are known or expected to be present at Foxearth Meadows. In her talk on behalf of the British Dragonfly Society, Pam Taylor explained the importance of small reserves for Odonata and introduced the move to identify dragonfly hotspots as foci for conservation and public outreach. It was interesting to get the



Brown hawker dragonfly (*Aeshna grandis*) ovipositing in the banks of a pond.

Photo: Alvin Helden

understanding from these two talks that small reserves may be more valuable for the conservation of Odonata than for butterflies.

The final talk was given by Mark Prina, who gave us a history and habitat structure of the Foxearth Meadows reserve and explained how A Rocha are providing visitor facilities and managing the site for the conservation of Odonata and other wildlife. A Rocha had held a bioblitz event at Foxearth in early June, so Mark also told us of some of the interesting species that have been found in the reserve.

We had a delicious and plentiful buffet lunch and then headed for the Foxearth Meadows reserve for the rest

of the afternoon. Mark guided us around the site and showed us some of the work that has been going on there. We paid particular attention to the ponds on site as well as the River Stour, which forms the northern border of the reserve, all of which were alive with dragonflies and damselflies. During the afternoon 14 different species of Odonata were seen. We enjoyed watching the white-legged damselflies (*Platycnemis pennipes*) amongst the numerous banded demoiselle (*Calopteryx splendens*) along the river, distinguishing the red-eyed (*Erythromma najas*) and small red-eyed damselfly (*Erythromma viridulum*) and standing on the side of a pond and watching a brown hawker dragonfly

(*Aeshna grandis*) laying her eggs in the bank almost under our feet. The afternoon was so absorbing that it was one of those occasions that when I at last looked at my watch I could not believe where the time had gone. I think everyone else felt more or less the same.

Although we were only few in number it was an excellent, friendly and very enjoyable day and I hope we can do something similar in future. I would particularly like to thank Mark Prina and Andy Jowitt from A Rocha, for their willingness and interest in holding the joint meeting, and in their arrangement of the venues and the catering.



Insect Conservation Special Interest Group Meeting

Wheatfen Nature Reserve, Norfolk
27th June 2018

Conservation of the Swallowtail in Britain

A joint meeting with the *Swallowtail and Birdwing Butterfly Trust*
Hosted by the *Ted Ellis Trust*

Richard Harrington

Worldwide there are around 560 Swallowtail and Birdwing species (Papilionidae). We have just one in the UK and it must surely be our most iconic butterfly. I thought I knew a fair amount about it. I do now. On a magnificent late June day, fifty enthusiasts gathered at the *Ted Ellis Trust's* Wheatfen Reserve, Surlingham, Norwich, to hear excellent, informative talks and then go hunting.

Well-known natural history writer Patrick Barkham spoke eloquently about his love of butterflies, the vulnerability of the British subspecies of Swallowtail, *Papilio machaon* ssp. *britannicus*, and its importance in encouraging conservation. A few days

later he published an excellent piece in *The Guardian* about the event.

Andy Brazil, County Butterfly Recorder for Norfolk, charted the history of the British Swallowtail, beginning in 1717 when it was named the "Royal William" in James Petiver's work *Papilionum Britanniae Icones (Images of British Butterflies)*. There is some confusion about its host plants and distribution in earlier years, but it undoubtedly occurred widely across Britain. The Swallowtail's demise was brought about by the draining of fens for agriculture. It died out at Wicken Fen in Cambridgeshire in the 1950s but is doing well in Norfolk, which showed a 66% increase in numbers

between 1976 and 2015 and a 23% increase between 2005 and 2015. From the outliers on distribution maps, Andy concludes that males have a flight range of around 30km, more distant outliers, some quite extreme, probably being the result of pupae being exported with Norfolk reeds used for thatching.

The importance of both the quality and quantity of water to fenland ecology was highlighted by Tim Strudwick and Matt Wilkinson from the RSPB's Strumpshaw Reserve. The fens, of course, are not just managed for Swallowtails. The default management method is mowing, but Milk Parsley doesn't respond well to this. Swallowtail larvae feed on the small

number of very tall Milk Parsley plants and learning how to create the conditions that allow the plants to grow to their full height is key to the butterfly's fortunes. It seems as though Swallowtails fare best in unmanaged fen, but there is very little science underlying management methods, evidence being mainly anecdotal.

Sea level is rising by more than 3mm a year and, together with tidal surges and storm events, this poses a threat to the fen habitat within decades. Andrea Kelly, Senior Ecologist with *The Broads Authority* said that there are virtually no data relating biodiversity hotspots to risks of saline incursion. We must be prepared for environmental changes, species translocation being well worth considering. The fens support 1500 species of conservation concern, 66 of them relying entirely on the Broads. Only 20% of fen habitat has the reed and Milk Parsley combination required by the Swallowtail.

Sara Oldfield of the *IUCN Species Survival Commission* outlined the government's 25-year environment plan and ecological restoration projects such as the "Fens for the Future" partnership which will restore and reconnect the fens. Since 1995, the RSPB has recreated 400 hectares of wet reedbed, ungrazed fen and wet grassland at Lakenheath. Well established reedbeds are maintained by cutting to achieve a mosaic of old and new reeds. Lakenheath forms part of a network of other fenland nature reserves, some of which are undergoing similar restoration and extension. The Great Fen project is a 50-year plan to create a 3700-hectare wetland centred on Woodwalton and Holme Fens. A show of hands suggested that most at the meeting would welcome scientifically assessed species translocations.

Michael Blencowe, *Sussex Wildlife Trust*, hates cats. Poppy the puss killed one of Sussex's first overwintered European Swallowtails (*P. machaon* ssp. *gorganus*). Following a massive invasion in 1945 only a few were seen each year until 2013 when there was another large invasion resulting in the first confirmed overwintering. Much interest from the public was generated through Michael's efforts and this helped to track larvae and pupae and follow them through to emergence. As an aside, Michael is co-author of *Butterflies of Sussex* and was happy to show-off the book's five-star reviews.





He also berated a poor soul who gave it only four stars and there was much mirth when it transpired that the reviewer was in the room. He took it in good humour! As to whether the European subspecies is welcome or a threat, there were mixed views.

In the general discussion, ably led by Mark Collins, Chair of the *Swallowtail and Birdwing Butterfly Trust*, a worrying overlay of Swallowtail breeding sites and the Norfolk coastline with a 50cm sea-level rise showed that practically all the current breeding sites would inevitably become saltmarsh in the passage of time. A key emerging point was that more research is needed into the requirements of Milk Parsley before translocation can be considered. Attempts at Wicken Fen failed because the plants were too small; the butterflies do best when Milk Parsley achieves its natural two-metre height. Most problems with butterflies at the edge of their range are related to microclimate. Living amongst reeds over water increases the temperature just enough, it seems.

Dick Vane-Wright (Canterbury University) summed up. I had no idea that there were so many subspecies of *P. machaon*, at least 24 spread across Europe and North America, and Dick pointed out that with considerable hybridisation the species is hugely complex. He concluded by praising the *Swallowtail and Birdwing Butterfly Trust* for calling the meeting and advised that partnerships amongst the 25 or so organisations represented in the room will be needed to tackle the challenging task of conserving these magnificent butterflies.

A quite superb, home-prepared lunch and a hugely enjoyable walk around the fen led by Will Fitch and Kevin Radley of the *Ted Ellis Trust* completed a memorable day. Lucky participants caught fleeting glimpses of adult Swallowtails, but all saw eggs and larvae.

Many thanks to organiser Mark Collins and SIG Convenor Alan Stewart, to the *Ted Ellis Trust* and to the *Swallowtail and Birdwing Butterfly Trust*.

Invertebrate Rearing And Insectary Management Special Interest Group Inaugural Meeting

**Syngenta, Jealott's Hill International Research Centre
26th June 2018**

Richard Harrington

Nothing pleases a SIG Coordinator more than one of our members coming up with an idea for a new group, then getting on with it. So very many thanks at the outset to Gary Needham (Syngenta). With 45 delegates at the inaugural Invertebrate Rearing and Insectary Management SIG, the demand is clearly there.

Our invited speaker was certainly well qualified to talk about insect rearing. Clive Farrell, Hon FRES, invented butterfly houses and has developed methodologies for rearing their star performers. He currently owns the Stratford-upon-Avon Butterfly Farm, Butterfly World in Florida and Fallen Stones Butterfly Farm in Belize (from where livestock is shipped to many enterprises supported by Clive). Like many of us, Clive's interest began at an early age, Garden Tiger larvae providing the spark. I won't dwell too much on his butterfly life and times as they are reported in detail on pages 185 to 187 of *Antenna*

41(4). Suffice to say that his many acres at Ryewater Nursery in Dorset provide a hugely successful lesson on how to support our native butterflies. The key is a deep understanding of the ecology of the butterflies and their hostplants, and it is Clive's attention to detail that has brought success to both outdoor and indoor projects. One trick is the surface sterilisation of eggs with Milton Fluid to prevent pathogens. Rearing on fresh foodplant grown outside also helps because UV, which is not transmitted by glass, can destroy pathogens.

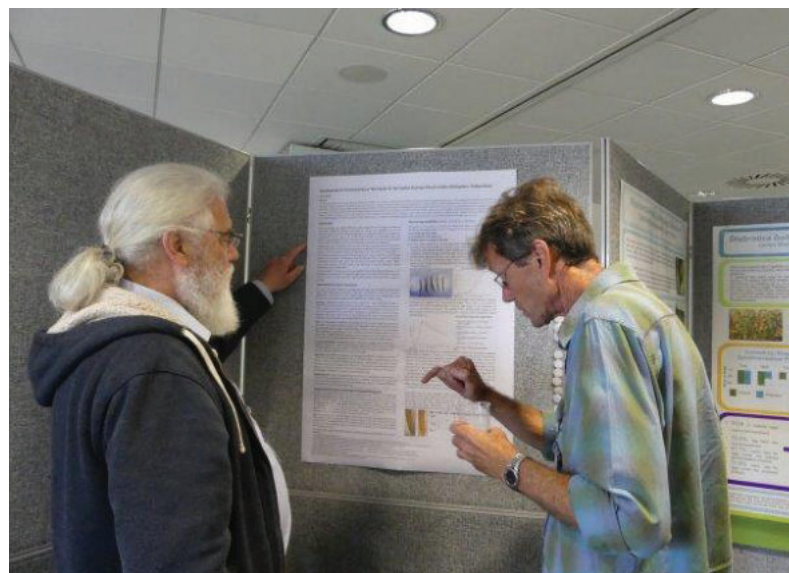
Entomophagy is a fast-growing theme, though one that has been practiced for millennia. Paul Latham (Salvation Army) described an edible caterpillar project, which he is overseeing in Bas Congo. Again, I'll limit the details here as the project is described in *Antenna* 42(3). Some of the edible caterpillars are also pests, presenting a potential win-win situation. As Paul says, in the Congo the

forest is the supermarket and, when it goes, people's lives become very poor. He is trying to encourage an increase in forest area and a reduction in charcoal extraction.

Syngenta's Paul Green outlined quick wins and pitfalls in rearing a range of pest insects for insecticide testing, gleaned from 25 years of experience. He considered the skill of culturing as a mix of challenge, fun and tedium. James Birchall, also from Syngenta, described a platform for screening new active ingredients against the Peach-potato aphid, *Myzus persicae*. As this was the species which had occupied the greater part of my career, I was intrigued to find hydroponic sprouting peas a hugely successful method of bulking up, especially as the aphid is not a pest of Pea. Nonetheless, the technique requires carefully controlled conditions of light, humidity and temperature. In 2017, 70 million aphids were produced using this technique. Completing



Invited speaker Clive Farrell.



Leslie Pattenden quizzing Jon Delf.



Organiser Gary Needham holding forth during the lunch-time tour...



....and some delegates looking interested.



Syngenta's *Myzus persicae* production system.

Syngenta's trio, Alicia Leroux, from their Stein facility in Switzerland, described the rearing, packaging and shipping of insects (especially *Ostrinia nubilalis* and *Aphis* species) for insecticide-resistance testing. The Insecticide Resistance Action Committee (IRAC) website provides details. A very interesting lunch-time tour of rearing and testing facilities brought these talks to life.

Some excellent posters were also on view at lunch time. Jon Delf (University of Liverpool, and perhaps the most prolific attendee of SIGs!) described techniques for the captive rearing of ten British bush cricket species. Bush cricket life-cycles can vary from 1 to 7 years, even within species, but Jon has developed techniques for compressing this to six months, making bush crickets practicable options for study. Rentokil, of course, is more concerned with killing insects than rearing them, but their poster (presented by Matt Green, Elysha Paterson and Sophie Thorogood) explained that culturing is needed in order to test manufacturers' claims and to put insect pests into context through displays for technicians and clients. James Birchall (Syngenta) described the demanding task of synchronising the production of 60,000 *Diabrotica balteata* eggs each week for the testing of new products by the Syngenta Discovery Biology team. He also demonstrated the *Myzus persicae* mass-production system in poster format.

Sabine Van Miert (Inagro, Belgium) described a multi-partner consortium called EntomoSpeed and stressed the importance of exchange of knowledge and expertise between researchers, policy makers and insect companies. More information can be found at <http://insectinfo.be>.

Finally, Kwasi Asante, a Ghanaian PhD student at Reading University, outlined his work rearing Cowpea Weevil, a legume pest. In Africa, Cowpea feeds 200 million people. The purpose of the rearing is to obtain parasitoids for release under field and storage conditions.

Syngenta Jealott's Hill did us proud – an excellent and friendly conference facility with superb refreshments.

This is a SIG community that will undoubtedly benefit through contact between meetings and Gary aims to facilitate that. Nonetheless, here's to the next meeting.

Return of the Buzz to the Big Bang

Francisca Sconce

The Royal Entomological Society returned to the Big Bang Science Fair at the National Exhibition Centre in Birmingham in March 2018, to promote studying and working in insect science, in collaboration with Harper Adams University following the success of our shared Entomology stand in 2017.

Armed with our new 'I held an insect' stickers (an excellent bribe) over 500 visitors each day held our six-legged friends, including Madagascar hissing cockroaches and leaf insects. Meeting live insects can help reduce fear and increase understanding of the importance of insects, particularly amongst those who may not have had the opportunity before. Also on display were a Florida katydid and some red goblin roaches, as well as a buff-tailed

bumblebee hive kindly donated by Koppert Biological Systems UK.

Under binocular microscopes, kindly lent by Harper Adams University, we had specimens of economic importance such as pea aphids and grain aphids. Elsewhere on the table we had the Society's drawer with prepared specimens of different UK insect taxonomic orders.

We also raised awareness about studying entomology with Harper Adams' range of undergraduate and postgraduate insect-related courses. Career options in Entomology were illustrated with our 'How can you work with insects?' banner.

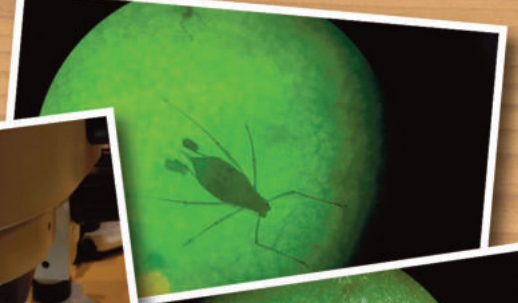
A huge thank you to the students and staff from Harper Adams

University and the Royal Entomological Society who supported our stand. A special thanks to Liam Crowley and Scott Dwyer who came every day and helped with set-up and take-down, the latter most unexpectedly during the 'Beast from the East 2' snow!

The Royal Entomological Society is committed to promoting and increasing public understanding of entomology. Events with a large and diverse audience are excellent opportunities to engage with the public. If you have suggestions for where the Society should get involved please contact Luke Tilley and Francisca Sconce.







Post visit report of ESA-2017 regarding CPF from RES, UK

Dr. Bilal Saeed Khan (PhD), FRES, FLS

Member Entomological Society of America (ESA-USA)
Lecturer, Department of Entomology,
Faculty of Agriculture, University of Agriculture,
Faisalabad, Punjab, Pakistan 38040



Being a Fellow of the RES, I am thankful to have received a grant awarded as 'Conference Participation Fund' (CPF) support. The Society's kind and timely decision regarding partial support to my application ensured my participation at the 65th Annual Meeting of the Entomological Society of America in Denver, Colorado, USA during November 5-8, 2017 to give an oral presentation of a research paper (partial funds from PSF, Pakistan).

I have been a regular member of the Entomological Society of America (ESA) since 2014, and the first Pakistani member, participating consecutively at their annual congress (now for the 3rd time) in 2015, 2016 and 2017. ESA annual meetings have always been considered as one of the largest platforms in the entomological sciences to share ideas and develop future collaborations. More than 2,500 scientists attended this meeting. At the end of the meeting, I was delighted to be offered ad-hoc membership of the ESA Education and Outreach Committee 2018.

It is very well known that such scientific research congress meetings act as a welcome source of motivation and information for academic and scientific communities. These activities provide marvelous opportunities to exchange scientific outcomes of knowledge

creation. Scientific congresses are ideal places to find out what has advanced in a specific field, observe various trials, debates and current controversies, meet interesting people, make contacts for the future and, in general, interact with professionals in their fields. The basic objective for my having selected this meeting for a RES CPF grant application was the availability of all these benefits, as applied to my own interests on the diversity, biology, behavior, rearing and control of plant feeding insects and mites, and how these topics relate to invertebrate control on a global scale.

Collaboration/talks with participants:

During the Scientific meeting days, I met with different researchers and expected future academic interaction was enthusiastically discussed. I was especially pleased to have had the opportunity to meet and talk to the following delegates:

Dr Abbas Ali: Principle Scientist, National Center for Natural Products Research, University of Mississippi, USA.

The main topic of conversation between Dr Ali and myself was focused on current products utilised in American and European agriculture, including plant protection chemicals and fertilisers. Based on our discussion it is hoped that we can initiate collaboration for short-term training and Postdoc study programs for Pakistani faculty members. In addition to talking around crop pests, mosquito control programmes in the USA were also discussed.

Dr Sam Bolton: Systematic Entomology Lab, USDA ARS, Maryland, USA.

The interaction between Sam and I was directed toward the potential for joint research programmes on mites. Dr

Bolton guided me as to how new research grants can be pursued from the USDA to improve lab resources for work associated with plant production and protection.

Dr Abdul Hakeem: Research Scientist, USDA.

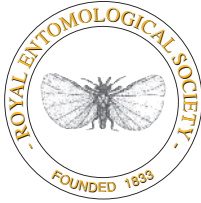
Dr Hakeem suggested that a Pakistan Entomological Society might be created, which could be an extremely exciting proposition; efforts will be made to continue to interact here to drive this forward, and an application for part-funding is anticipated for submission to the Education and Outreach Committee of the ESA. Such a venture would hugely help our young scientists to represent themselves at an international level, which would ultimately help our Pakistani academic community to access research funds for entomological science at a global level.

Dr Shahid: Research Scientist.

Dr Shahid and I discussed medical entomology. He emphasized that joint research efforts can be created between the UAF faculty and USDA scientists, advising that some work regarding vector borne diseases of ticks and mites must be initiated from Pakistan. This will be another opportunity that I'll be looking into further.

Dr Ronald Ochoa: SEL, USDA ARS, Maryland, USA.

My conversation with Dr Ochoa was very fruitful, focusing on the possibility of establishing an Acarology Museum in Pakistan. Dr Ochoa provided valuable guidance on how to seek the funds for such a project from the USDA and Pakistan. We also discussed the future challenges and opportunities of Acarology in general.



SCHEDULE OF NEW FELLOWS AND MEMBERS

as at September 2018



New Honorary Fellows

Mr W H F Blakemore
Professor Jane Memmott
Professor Paul Brakefield
Dr Hefin Jones
Professor Helen Roy
Professor Rebecca Kilner

New Fellows (1st Announcement)

Dr Jenn Brisson	Prof. Dr. Michael S. Engel
Professor Marie Dacke	Dr John Baird
Dr Matthew John Kirby	Professor Darija Lemi
Dr Takeshi Kawakami	Prof. Dr. T.B Sridharan
Dr Md. Aslam Khan	Dr Mantu Bhuyan

Upgrade to Fellowship (1st Announcement)

Mr Joe Gray
Dr Ali Abdulhusien Kareem

New Fellows (2nd Announcement and Election)

Professor Adriana Darielle Mejia Briscoe (as at 6.6.18)
Dr Tariq Ahmad
Dr Camilo Ayra Pardo

Upgrade to Fellowship (2nd Announcement and Election)

Dr Heather Campbell (as at 6.6.18)
Dr Nick Littlewood

New Members Admitted

Dr Vindhya Aryaprema (as at 6.6.18)	Dr Per T. Smiseth
Mr Mark Sheridan (as at 6.6.18)	Mr Roger Paul Cann
Dr Chloe Montes	Dr Catherine Burton
Mr Fredric Windsor	Miss Emily Dimond
Dr Ikechukwy Onah	

New Student Members Admitted

Ms Katherine Burns (As At 6.6.18)
Miss Eleanor Daisy Drinkwater
Miss Amy Arnott
Miss Amy Mcleman
Ms Angela Hayward

Re-Instatements to Fellowship

None

Re-Instatements to Membership

Dr Muhammad Tariq

Re-Instatements to Student Membership

Ms Nancy Naanogot Dawam

Deaths

Dr H M Darlow, UK, 1944
Professor P Zangheri, UK, 1989
Professor L P Brower, USA, 1975
Dr N M Bailey, IM, 1949



SCHEDULE OF NEW FELLOWS AND MEMBERS

as at 3rd October 2018



New Honorary Fellows

None

New Fellows (1st Announcement)

Dr Marcio Roberto Pie

Upgrade to Fellowship (1st Announcement)

None

New Fellows (2nd Announcement and Election)

Dr Jenn Brisson
Professor Marie Dacke
Dr Matthew John Kirby
Dr Takeshi Kawakami
Dr Md. Aslam Khan
Prof.Dr. Michael S. Engel
Dr John Baird
Professor Darija Lemi
Prof.Dr. T.B Sridharan
Dr Mantu Bhuyan

Upgrade to Fellowship (2nd Announcement and Election)

Mr Joe Gray
Dr Ali Abdulhusien Kareem

New Members Admitted

Dr Polly Hayes
Mr Mike Peter Shurmer
Dr Dara Anne Stanley

New Student Members Admitted

None

Re-Instatements to Fellowship

None

Re-Instatements to Membership

None

Re-Instatements to Student Membership

None

Deaths

None

Book Reviews

Brilliant Burnetology

The Natural History of Burnet Moths (*Zygaena Fabricius, 1775*) (Lepidoptera: Zygaenidae). Part 1.

Proceedings of the Museum Witt, Munich 6(1): i–xviii + 1–630 pp.

Axel F. Hofmann & W. Gerald Tremewan

Munich and Vilnius

€150

Books often come in extremes – small, large, pitiful, essential, dire, delightful. This mighty tome (3.25 Kg), with over 600 A4 pages, 4,464 figures (very many in colour), 73 tables and 598 references, is simply *brilliant* – one of the most outstanding works on a single group of insects that I have ever had the pleasure to contemplate.

According to the *Preamble*, its origin goes back almost three decades, to May 1989, when the authors were carrying out fieldwork in the High Atlas of Morocco. Some information about them would therefore seem desirable. For the redoubtable Cornishman Gerry Tremewan (1931–2016) – who so sadly died a few short months before publication – readers can find an enormous amount in Hofmann *et al.* (2017), testament to the huge esteem and affection in which Gerry was held by all who came into contact with him.

In comparison, Axel, a denizen of southern Germany who lives near Freiburg i.Br., even though known to me personally, is almost totally self-effacing (other than in the manner of informal images – he appears in field- and work-shop photographs, often with Gerry, at many points in the book). Hopefully this lack of an accessible autobiographical note will soon be made good. Meanwhile, to Axel now falls the great task of completing the two planned companion volumes. Part 2 will be a continuation of Part 1, with a further 14 chapters – including those on reproductive biology, parasitoids, genetics, defence, and conservation. Part 3 will address systematics, with special reference to variations in behaviour and phenotype affecting all life stages of each species.

So what does Part 1 offer? Following the usual preparatory sections and very extensive acknowledgments, the book is thereafter divided into eight numbered but unequal chapters:

1, Introduction and abstracts (pp. 2–7); 2, Origin, phylogeny, out-groups and systematics (10–63); 3, The *Zygaena purpuralis/minos* complex (66–75); 4, Distribution and zoogeography (78–268); 5, Morphological terminology and early stages (272–335); 6, Variation in phenotype (338–395); 7, Geographical patterns and clusters (398–445); and 8, Historical observations on the biology of burnet moths (448–512). The final pages of Part 1 are devoted to Genitalia structures (515–582); References; Glossary (603–610); and Index.

What is probably the most original aspect of this work is flagged on page 3 of the *Introduction*: “For the first time ever we bring into focus the variation that is found in *all* stages (adults, egg batches, larvae, cocoons, pupae) of a burnet moth over its entire distributional range.” This variability is then “... compared and when possible, interpreted in an ecological-geographical context. Consequently, we have attempted to describe and analyse that which is called the *holomorph*, i.e. the species with all its characters in all its stages, and to fill with substance the two topical ‘buzz words’ *diversity* and *biospecies*.” This wonderful ambition animates the entire work.

Chapter 8, however, in some ways stands alone. It includes 70 vignettes, short to extensive, celebrating the lives and achievements of those individuals who have arguably contributed most to ‘burnetology’ (see below). While this is wonderful to have, it is rather sad to note that natural modesty has apparently prevented the authors from inclusion. As already indicated, at least the memory of Gerry is now excellently served (Hofmann *et al.* 2017). This unique chapter concludes with accounts of 14 international symposia devoted to burnet moths, a series instigated by Gerhard Tarmann in 1980 – amazing testament to the enthusiasm these creatures can engender, leading to the creation of scientific natural history at its collaborative and social best. I believe it is often forgotten that science is a cultural activity.

This treatise is based to a great extent on the authors’ almost unbelievably extensive field- as well as laboratory-



The authors



Figs 241–244. Fully grown larvae of *Zygaena purpuralis* (Figs 241a, 241b), *Z. alpherakyi* (Figs 242a, 242b), *Z. minos* (Figs 243a, 243b) and *Z. pseudorubicundus* (Figs 244a, 244b).

Zygaena purpuralis

In spite of wide geographical distance, the larval variation in the phenotype of this species is very poor. (a) Kyrgyzstan, Issyk-Kul S., Chichkan riv., 2.vi.1993 (O. Gorbanov); (b) Germany: Baden-Württemberg, Irendorfer Hardt, vi.1980 (C. M. Naumann).

Zygaena alpherakyi

Typical high-mountain phenotype (vide p. 417) with dark pigmentation and strongly contrasting yellow dorso-subdorsal spots. (a, b) Dagestan Kurush vic., 2.900 m. e.o., x.1996 (C. M. Naumann).

Zygaena minos

This 'species' exhibits remarkable differences in the larval phenotype depending on the provenance. (a) *Z. minos alpherakyi* (Hadjin), Turkey: Samibeçli (Hadjin), 17.v.1988 (W. G. Tremewan); (b) Germany: Werbach, Tauberland, v.1983 (C. M. Naumann).

Zygaena pseudorubicundus

Similar to *Zygaena minos* from Turkey but more bluish white; larvae from the Zagros range and from the Alborz are indistinguishable; (a, b) Iran: Alborz, Quvin N., Gardaneh Alamut vic., 1.700 m. e.o., 8.iv.2016 (A. Hofmann).

work, carried out across the mainly western Palaearctic range of *Zygaena*, much of it in mountainous areas such as the High Atlas, and even higher and more inaccessible (not to mention dangerous) parts of Iran and Afghanistan. The authors recognise their pursuit, with more than a hint of self-deprecation, as an 'ology' (i.e. "zygaenology": p. xii). To gather original data on the scale necessary to fulfil the authors' aim to describe and analyse the holomorphs of the 108 currently recognised species, each within its own unique, yet often geographically varying *Umwelt*, a considerable degree of obsession with what in Anglo-Saxon we might alternatively call 'burnetology' was surely essential!

Such focus inevitably brings some limitations as well as benefits. For example, the authors offer a very interesting discussion on variations in hybrid compatibility/incompatibility (page 61) – but without any reference to the literature on the general subject. To note just two papers that could have been cited: interpretation of the range of compatibility

would have been made more interesting by comparison

with, for example, Shigeru Ae's original work on hybridisation in *Papilio* (e.g. Ae 1979).

And the biological species concept attempt to equate heterospecificity with "reproductive isolation" never feels quite right when you consider Donn Rosen's (1979) point that interbreeding is a plesiomorphic condition (and thus "its discovery among organisms in closely related species is neither surprising nor particularly informative" – Wheeler & Platnick 2000: 56).

In a similar way, the authors' highly original and extensive exploration of altitudinal distribution (pp. 92–119) could have benefited from discussion of elevational diversity gradients in light of, for example, the mid-domain effect (Colwell & Lees 2000). Thus, in their figures 444–446, the authors offer superb data on the "vertical distribution of [the 21] *Zygaena* species ... in North Africa", divided into three different groups: littoral-montane species (with an altitudinal span of 0–2,600 m), montane inland species (800–2,600 m), and high mountain species (2,000–3,300 m). Although not analysed in mid-domain terms, figs. 444–446 clearly indicate a very pronounced mid-altitude diversity peak – made all the more interesting by "the remarkable depression in the distributional curve between 100–700 m" (p. 114) affecting the first group – a phenomenon convincingly argued by the authors to be due to intense anthropogenic habitat alteration in the 100–800 m zone.

Unless I missed something, I was hoping to find the basis on which the "altitudinal span" of each species was determined – simply the highest and lowest recorded observations for adults? – or the range over which each given species can successfully breed? Perhaps in slow-flying *Zygaena* these are considered more or less coincident – but this is not self-evident (and I very much doubt it is the case in butterflies: Liseki & Vane-Wright 2011: 2392). Perhaps this will be discussed in Chapter 13 of Part 2, which is to address "spatial dynamics such as dispersal and colonization". In this context, Bob Carcasson's notion of *vertical overlap* (Carcasson 1964: 134) would also have been worth discussing, given the rich data presented by Hofmann & Tremewan. Tables 8 (Iran) and 8a (Maghreb) are structured according to the mid-range value of the span for each included species – but the great sensitivity of mid-range values to outliers is not discussed.

A striking change over the last two decades has been the switch, following the cladistics 'revolution' of the 1980s and arguably sparked by Losos (1996), to widespread adoption of 'tree-thinking' (Baum & Smith 2012; Funk 2018) in evolutionary ecology and related disciplines. And tree-thinking is significantly in evidence here. I counted four primary cladograms, all attributed to their relevant sources, the fourth of which (species group relationships within *Zygaena* 4: fig. 182) is then used for over 30 'tree-thinking' analyses. Nearly all of these are found in Section 4, where they are employed to demonstrate diversity and endemism among *Zygaena* species within a series of designated regions. But three are used to explore data on oviposition behaviour and cocoon colour (Table 67), larval coloration (Fig. 1938), and other cocoon characteristics (page 403, unnumbered). These very interesting presentations are made apparently without comment as to method or possible limitations of the underlying cladograms.

But in many ways these 'disconnects' are one of the delights of this amazing book. With such an extensive mix of data, analyses and discussion, you can almost hear the dialogue between the two authors as they picked their way over the mountain of data accumulated – a very significant portion of which they gathered themselves. Based on their adventurous lives with the living moths, we can appreciate Axel and Gerry as if they were latter-days Goethes, their whole approach a form of 'delicate empiricism' (Zarte Empirie: Wahl 2005). And this is reflected in the references, the great majority of which relate to first-hand studies on *Zygaena*. Indeed, well over one third of all the references are first-author contributions from just a dozen of the greatest of all the burnetologists – including the outstanding Clas Naumann, Gerhardt Tarmann and Hugo Reiss, as well as the authors themselves.

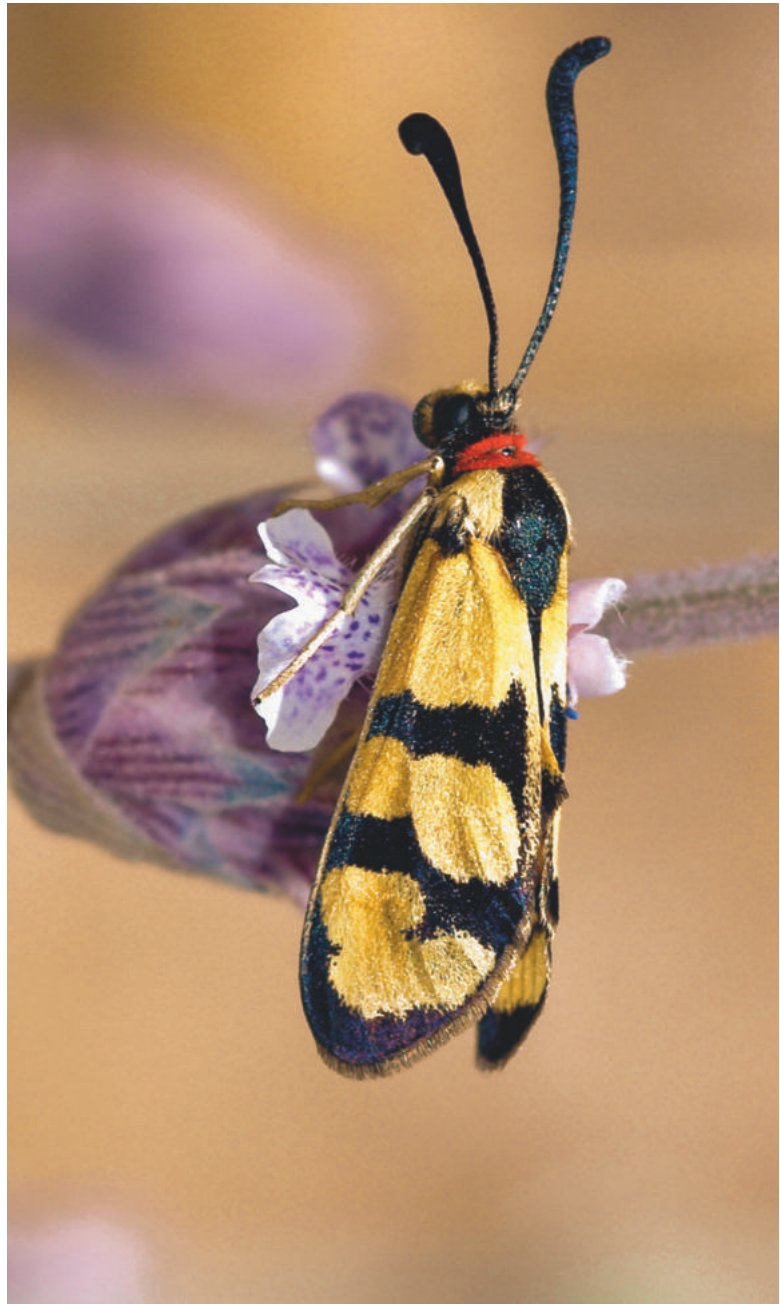
And all so richly illustrated – with numerous superb images not only of the adult moths (some dead but many very much alive) and their early stages – but also the incredibly varied and beautiful biotopes they occupy, from sea level to high peaks – all accompanied by line drawings, maps, the annotated cladograms, portraits of past masters, conference photographs (so

many other burnetologists!), even a fossil (*Zygaena miocaenica* Reiss, 1936 – fig. 7). As you browse or read intently, you can pick up ideas or parallels to your own ‘ologies’ or interests, without bias due to over-interpretation of work by others on widely different organisms. The authors do not just “let the data speak for themselves” however – far from it – but the interpretations are largely theirs. And that is the beauty of a really good book – it speaks from the heart of the author(s) without excessive indulgence in the academic game of name-dropping and connecting. With a source such as this, that is for the reader to do – and enjoy doing.

I can end in no better way than to quote from one of the two prefaces, by another remarkably dedicated lepidopterist: “One of the great conundrums of humanity is that we lay waste the life treasures on our own planet whilst ardently seeking new life on others. The harsh truth of it is that our greed to exploit exceeds our inclination to protect; in too few human beings do pure curiosity and respect of other creatures outweigh more selfish motives. The blessing is that such special people do exist, they are the very best of humankind; we have two of these rare individuals in Axel Hofmann and Gerry Tremewan, the authors of this wonderful three volume monograph on burnet moths” (Roger Dennis, in Hofmann & Tremewan 2017: viii).

I can only concur, without reservation – and note that I am given to understand that one of the remaining volumes is now close to publication. Beautifully presented, printed and bound through the good agency of the Thomas Witt Foundation, burnetologists must wait a little longer for completion of their best-ever *vade mecum*.

Dick Vane-Wright



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Minibeasts: True rulers of our world and the key to our survival

Alan Henderson
Exisle Publishing
ISBN 1-925335-84-2
£22.99



Minibeasts is a coffee table book with a mission. Its larger format provides the ideal platform to display the many stunning photographs which will certainly arrest the reader's attention, while the text is slipped between the images delivering a series of short but in-depth introductions to various aspects of invertebrate biology.

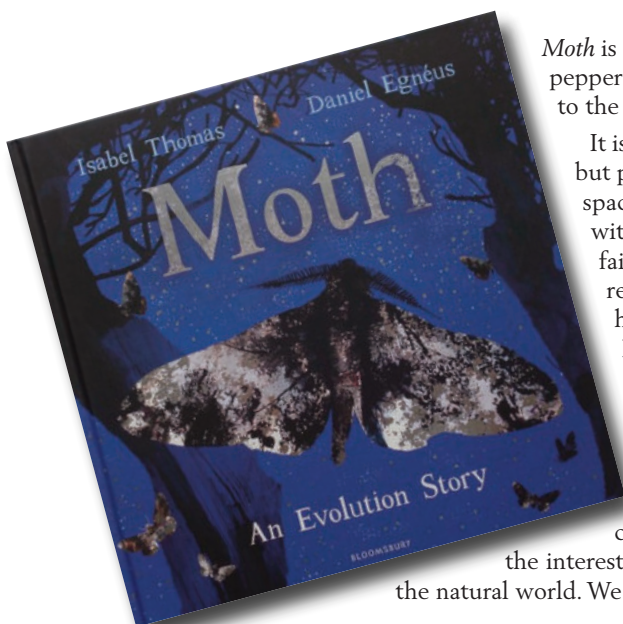
'Tools of the Trade' examines the morphological adaptations that enable minibeasts to sense the world around them and move around their habitats. 'The Real Transformers' looks at metamorphosis, while 'Shape and Form' marvels at the incredible variety of the minibeast form. 'Life on the Wing' examines the variety of wing numbers and shapes found in the insect world and introduces the various ways they are powered, while 'Face to Face' is a series of portraits that introduce minibeasts as characters that the reader can relate to, positively or negatively. There are seven more chapters that deal with camouflage, aquatic invertebrates, mimicry, reproduction, parental care and life below ground, with a final chapter on technological and medical innovations inspired by and using invertebrates.

Minibeasts is a book designed to open the eyes of the uninitiated and then feed them snippets of information that will arouse their curiosity. The photographs are dazzling, offering a carnival of invertebrates to entertain the reader, while the text is light and informative with a dusting of humour. If you need to persuade anyone that invertebrates are important, fascinating and well worth a second look this is the book you need. It will enthrall and amaze both older children and curious adults, offering them a better understanding of the role invertebrates play in the natural world.

Peter Smithers

Moth: An Evolutionary Story

Isabel Thomas & Daniel Egneus
Bloomsbury Children's Books
ISBN 978-1-4088-8975-6
£12.99



Moth is a story of light and dark, a story that biologists know well; a story of how the peppered moth adapts to the consequences of industrial pollution, and then again to the subsequent return to a clean environment.

It is written as a series of easy-to-read couplets that reveal the story in a concise but poetic style. The text is sparingly scattered over the pages, leaving maximum space for the illustrations; and it is these that will grab the reader's attention with their bright, bold and colourful graphic style. They invoke the sense of a fairy tale, a journey with our moth through dark and dangerous places but returning to safety in the end. The pages are filled with drama, occasionally humour and the image of a small child that appears here and there offers a link to the reader. At the rear of the book there is a conventional account of the peppered moth story which explains the concepts of natural selection and adaptation.

Moth brings a piece of classical biology to a much younger audience than previously attempted but it is certain to be highly successful. It is a gloriously vibrant celebration of adaptation in the face of environmental change. This very modern presentation of an old ecological story will pique the interest of young readers and hopefully set them on a path to a lifelong interest in the natural world. We hope this tale of light and dark will illuminate many young minds.

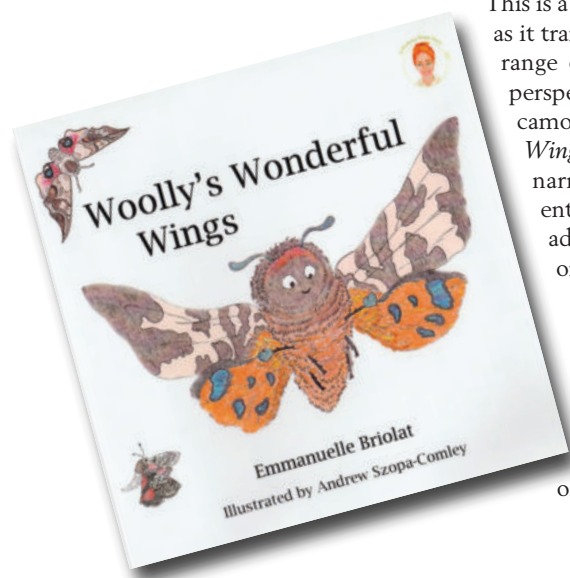
Peter Smithers

Woolly's Wonderful Wings

Emmanuelle Briolat, illustrated by Andrew Szopa-Comley

Published independently

Price £5.00 P&P £1.50 in UK



This is a children's adventure that is steeped in insect biology. The story follows a garden tiger as it transforms from a larva to an adult moth and explores its local environment, meeting a range of other moths and butterflies on its travels. While it is written from a child's perspective, each interaction explores a different aspect of wing colouration, from cryptic camouflage to defensive eye spots plus warning colours and patterns. *Woolly's Wonderful Wings* is an engaging story packed with biology that does not detract from the engaging narrative. It lucidly blends a sense of wonder and exploration with some great entomology. The story is accompanied by a series of drawings that illustrate the colour adaptations described in the text. At the rear of the book there is a section that expands on the adaptations described, along with photographs of the characters from the story.

Older children will enjoy this tale of exploration and discovery while learning much about the way that moths and butterflies use wing colouration. *Woolly's* adventures will transform the way that readers of all ages view their local Lepidoptera.

This book may be ordered online from:

<https://www.etsy.com/uk/shop/Books4Wildlife>

or directly from the author at: 26, West Street, Penryn, TR10 8ER.

Peter Smithers

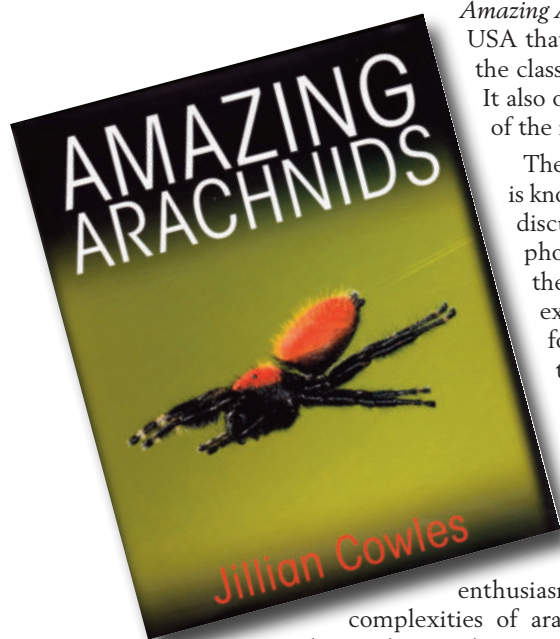
Amazing Arachnids

Jillian Cowles

Princeton Press

ISBN 978-0-691-17658-1

£34.99



Amazing Arachnids is a wonderful introduction to the arachnid fauna of the south-western USA that covers all ten orders within the group. The book opens with an introduction to the class Arachnida, outlining their general morphology, biology and evolutionary history. It also offers a taste of one of this book's great strengths – series of excellent photographs of the main arachnid groups.

The following chapters explore each order in more depth, outlining the biology that is known and offering a series of high quality photographs of the features and behaviours discussed. Some of these photographs show behaviours that have not been photographed before. Also, each chapter ends with a series of photographs that outline the principal taxonomic groups found in the region. While this book covers all of the extant orders of arachnid in as much detail as our current knowledge allows, its main focus is on the spiders with over half of the book dedicated to this order as this is the group that arachnologists have a much better understanding of.

The spider section opens with a discussion of sociality in spiders, the use and structure of spider silk, reproductive behaviour and intelligence, with the following eleven chapters offering an introduction to the biology of groups of taxonomically-related families that inhabit the region.

Jillian Cowles writes with an easy informality, often adding in her own observations and perspectives, which add a personal touch and allow her enthusiasm to shine through. While the style is informal she is quick to delve into the complexities of arachnid biology, offering an intriguing window into the lives of these often-misunderstood invertebrates.

Amazing Arachnids is a beautifully illustrated and informative celebration of the fascinating world of arachnids. It will appeal to natural historians and undergraduates who are looking for an easy entry into the complexities of arachnid biology. Its combination of stunning photographs and easy but informative text will pique the curiosity of both students of the SW American invertebrate fauna and anyone wanting a broad overview of this fascinating group.

Peter Smithers

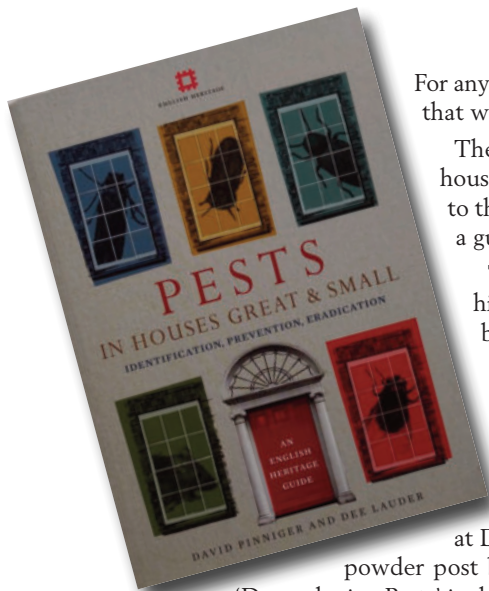
Pests in Houses Great and Small: Identification, Prevention, Eradication

David Pinniger & Dee Lauder

English Heritage

ISBN 978-1-910907-24-5

£14.99



For anyone who is managing or living in an older property this book will be a valuable resource that will help them detect, identify and eliminate common pests.

The book comprises an introduction that outlines the history of our understanding of household and structural pests, plus the damage that they can cause. It also includes a guide to the range of invertebrate and vertebrate pests that can occur in older houses, and finally a guide to the management and prevention of these pests.

The second part, 'A Guide to Pests', begins with a brief survey of household pests in history, ranging from ancient Egypt to the present day, plus a short introduction to insect biology. The following section discusses individual groups of pests looking at their life cycles, food preferences, damage caused, their UK distribution and advice on control. 'Clothes and House Moths' deals with common clothes moth, case bearing clothes moth, pale-backed clothes moth, brown clothes moth, white-shouldered house moth and Indian meal moth, with a case study of clothes moths at Rangers House in London. 'Carpet Beetles' offers details of the Varied, Guernsey, Two spot and Brown carpet beetles as well as Hide and Leather beetles, with a case study of carpet beetle at Down house. 'Wood Boring Insects' describes furniture beetle, death watch beetle and powder post beetles, with case studies from Deal Castle, Audley End House and Dover Castle.

'Damp-loving Pests' includes silver fish, booklice, fungus and plaster beetles, and wood weevils, while 'Detritus Feeders and Scavengers' deals with spider beetles, mealworms and biscuit beetles. 'Flies' examines cluster flies and fruit flies, with notes on their biology and suggestions for repellents, but also focuses on the presence of dead flies as a resource for other pests. 'Other Invertebrates that are Found in Houses' deals with invertebrates that don't cause damage to homes or their contents but that can be a nuisance, such as ants, wasps and bees, ground beetles, ladybirds and spiders, while the section on 'Rodents and Birds' outlines the damage these can cause and the control measures that can be utilised. The section on new insect invaders offers a brief account of the recent introduction of potential pests, while the final chapter offers advice and guidance on monitoring in order to detect pests at an early stage, symptoms to look out for, and preventative strategies to be undertaken.

For those who manage historic buildings this is a concise, informative and practical introduction to the identification and management of insect and other pests. The photographs of the pest species are excellent and the images of the damage caused provide invaluable clues to investigators. The case studies are also very useful as they offer an insight into pest detection, from the discovery of a suspected pest to the tracking down of the source, which is often not the one that was anticipated. For other readers, it will be a fascinating glimpse behind-the-scenes of the management of the many historic houses that we Brits love to visit.

From ink-eating silverfish to beetles invading Christmas decorations, *Pests in Houses Great and Small* offers an insight into the diversity of problems that insects can cause and much advice on how to combat them. It is an excellent account of the vast amount of work that occurs unnoticed by visitors to the UK's historic buildings. *Pests* contains a wealth of information that will be useful to almost anyone who manages or lives in an older property.

Peter Smithers

The Butterfly Collection

Richard Harrington
Brambleby Books
ISBN 9781908241566
£20.00



The Butterfly Collection is definitely about butterflies but not as we normally see them. Richard Harrington has produced a wonderfully alternative take on the UK butterfly fauna, offering a personal and often idiosyncratic perspective on our island's 58 species. As it states on the cover, there is a poem for every British butterfly, but it is so much more than this. The poems are cheeky and irreverent but reveal a fascinating glimpse of butterfly behaviour, history, morphology, distribution or decline. They do this with a poetic ease that belies the hard biology that underpins them, as they are laced with years of field observations. These intimate portraits of our butterflies would be impossible without the many years that Richard has spent butterfly watching.

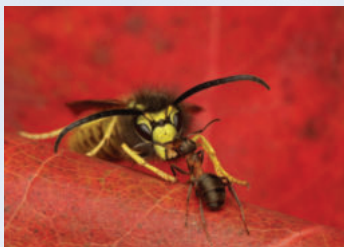
The poems themselves range widely in style from haiku to a barn dance call, and an identification key to Latin squares. Some are long (the Large Blue has 13 verses) while others are just a single couplet, and some play games with the patterns of the words on the page. They are amusing, delightful and informative; some will make you smile while others will make you laugh out loud. Richard also flirts with some of the great poets of the past, skilfully adapting the works of Wordsworth, Shakespeare and Kipling to produce a series of portraits which are instantly recognisable. Richard has introduced each species with a personal reflection on its biology or name, often with memories of his own field observations. These explain the nature of the poem and provide a backdrop for the verse.

There are also sections titled *Inspirations* which connect each species with a person who has influenced Richard's appreciation of butterflies. They read as a *Who's Who* of entomology, providing a fascinating insight into his career and a potted history of entomology at Rothamsted.

The book is lavishly illustrated with colour photographs of each species, which enhance and complement the whole experience of reading the poems.

The Butterfly Collection is an unusual fusion of the arts and sciences that have been blended with a large dose of the author's wit and obvious love of his subject. It is a celebration of the beauty and diversity of our butterflies that will be loved and cherished by all who read it.

Peter Smithers

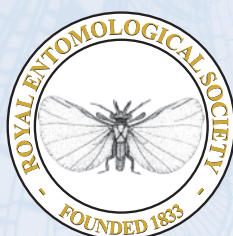
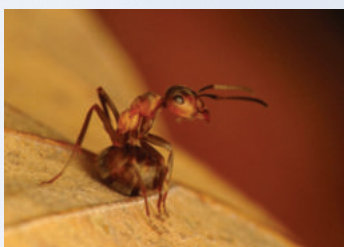


MARSH

Christian Trust



RES MARSH AWARD FOR EARLY CAREER ENTOMOLOGIST



Marsh Award for Early Career Entomologist recognises an individual who has made an early career contribution to Entomological Science, with a single or on-going impact to the field. It commends their dedication to the field, hard work and creativity.

Award Criteria

For an early career contribution to Entomological Science that is judged to be outstanding or exemplary with single or ongoing impact on the science. The Award is 'open' and not restricted to any particular discipline or specialised area of entomological science.

Prize

£1,250 and Certificate.

Eligibility

Any person whose work, or contribution, meets the Criteria. There are no geographic restrictions.

Cycle

Annual; nominations accepted until 31st December in any year, winner announced early in following year.

Adjudication

By a panel consisting of, the President, two senior Fellows and the Chairman or representative of the Marsh Christian Trust.

Entry

By letter of nomination from a Fellow of the Society, or, a person of standing in the field of entomological science. Additional letters of support welcome. The nomination should give as full a profile of the nominee as is possible with special emphasis on relevance to the Award Criteria. All entries to:

**The Registrar, Royal Entomological Society, The Mansion House,
Chiswell Green Lane, St Albans AL2 3NS**

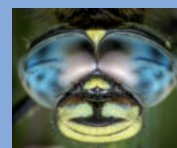
It is a condition of entry that the winner of the Award shall attend the annual Ento (or other nominated) meeting to receive it, at the Society's expense.

Further information

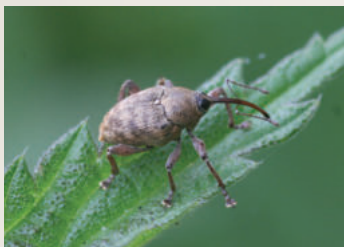
Websites www.marshchristiantrust.org/Early_Career_Entomologist
www.royensoc.co.uk/awards/Marsh_award.htm

2017 WINNER: JOHN SIMAIKA

With an already deep affinity for the protection of the environment, and a broad interest in the biological sciences, John studied at the University



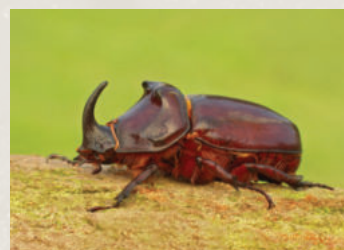
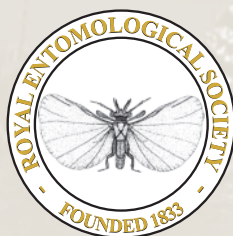
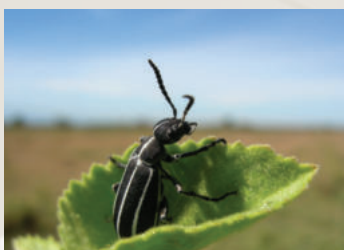
of Victoria, Canada, graduating with a B.Sc. in Biology (Honours) and Anthropology (Major). He continued his studies at Stellenbosch University, South Africa, with his M.Sc. (Entomology) focused on dragonflies as model organisms for developing and testing methods in freshwater conservation. For his MSc, he worked on developing and testing the Dragonfly Biotic Index (DBI) a rapid assessment index for South African streams, work which he continued for his PhD research. The remainder of John's Ph.D. focused on conservation planning. The spatial planning work concerned reserve selection using South African aquatic macroinvertebrates and habitat suitability modeling under projected future climate change scenarios in South Africa, and analysis of the representativeness of the continental African network of protected areas of aquatic biodiversity.



MARSH
Christian Trust



RES MARSH AWARD FOR INSECT CONSERVATION



The Award recognises an outstanding contribution to the field of insect conservation and is run in partnership with the Royal Entomological Society. The Award has been running since 2002 and is awarded annually.

Award Criteria

For an outstanding contribution to Insect Conservation; on the basis of 'lifetime achievement', or 'considerable and exemplary contribution' to a significant project or undertakings. In exceptional circumstances two prizes may be awarded to reflect each criterion.

Prize

£1,250 and Certificate.

Eligibility

Any person whose contribution to Insect Conservation meets the Criteria.

Cycle

Annual, nominations accepted until 31st December, winners announced in following year.

Adjudication

Shortlisting by RES Conservation Committee, final selection by Honorary Officers, Chair of Conservation Committee and M.C.T. representative.

Entry

Written nominations giving full outline of the reasons for the nomination and personal profile of the nominee, giving as much information as possible, to be sent to:

**Chair of the Conservation Committee c/o Royal Entomological Society,
The Mansion House, Chiswell Green Lane, St Albans AL2 3NS.**

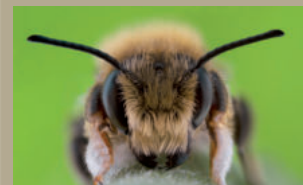
It is a condition of entry that the winner of the Award shall attend the annual Ento (or other nominated) meeting to receive it, at the Society's expense.

Further information

Websites www.marshchristiantrust.org/Insect_Conservation
www.royensoc.co.uk/awards/Marsh_award.htm

2017 WINNER: DR MIKE MORRIS

for his outstanding
contribution to Insect
Conservation on the basis of
lifetime achievement

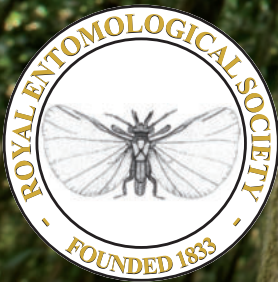


After 3 years as the V H Blackman Research Scholar in East Malling Research Station, Mike joined the Nature Conservancy's new research lab at Monks Wood (later NERC's Institute of Terrestrial Ecology), where he spent 15 years (1961-76) on research into conservation ecology, notably devising innovative field experiments to explore how different types of grassland management can restore and maintain distinctive species-rich-assemblages of insects, especially on lowland calcareous soils. For the rest of his career – 1976 to retirement in 1994 at the then obligatory age in government service of 60 – Mike Morris was Head of Furzebrook Research Station and ultimately Acting Director of ITE, as well as ITE's Head of Invertebrate Ecology since 1976.

ALFRED RUSSEL WALLACE AWARD 2018

For post-graduates awarded an outstanding PhD in Entomology!

Photo credit: Wallace's Cyrtopalus beetle (*Cyrtopalus wallacei*) by Tim Cockerill



REQUIREMENT

For post-graduates who have been awarded a PhD, and whose work is considered by their supervisory team to be outstanding. The research involved should be a significant contribution to the science of entomology.

WHO CAN ENTER?

All post-graduates who have been awarded a PhD degree, on the basis of a thesis written in the English language, within the period 1st October 2017-31st December 2018.

PRIZES

First Prize: £800 plus Certificate, plus one year's free Membership to Royal Entomological Society. The winner will also be required to present their work at a Society Meeting (all expenses paid) and submit an article to *Antenna*.

Runners-up: Up to four runners-up will have their names and abstracts published in *Antenna*.

ENTRIES

The candidate's supervisor or external examiner should complete the entry form available on the awards pages of our website, have it signed by the Head of Department, append a copy of the abstract of the thesis, and send it to:

The Registrar, Royal Entomological Society,
The Mansion House, Chiswell Green Lane,
St Albans, Herts, AL2 3NS
E-mail: kirsty@royensoc.co.uk

Please do not send the thesis itself until requested to do so.

The candidate will at that stage be asked to provide a 500 word statement expressing in layman's terms the contribution that their work has made to entomology and selected entries will be asked to submit their theses.

Following thesis submission, up to 5 candidates will be invited to The Mansion House in person (UK travel will be paid), or virtually if not

UK-based, to deliver a 20 minute presentation and engage in a 20 minute question/answer session with the judges.

THE JUDGES

The judges' panel will consist of a group of senior Fellows of the Royal Entomological Society. The judges decision is final.

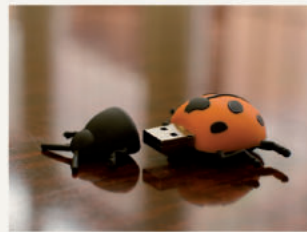
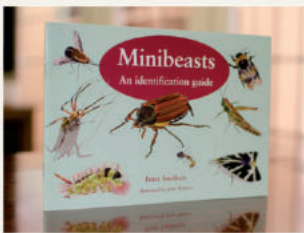
CLOSING DATE

The closing date for entry is 31st December 2018. Winners will be announced in the Spring 2019 edition of *Antenna* and on the RES website www.royensoc.co.uk



ROYAL ENTOMOLOGICAL SOCIETY ONLINE SHOP

THE PLACE FOR ALL GIFTS INSECT-RELATED...

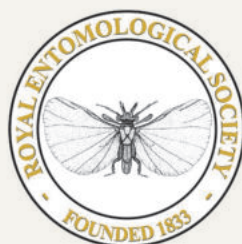


IMAGES © RES AND LEIGH HOWELLS

From Annual Membership Renewal to casual clothing, rare watercolour greetings cards to notebooks, colouring books to playing cards, and even ladybird USB drives! There are many insect-related gifts to check out on the Royal Entomological Society's online shop.

Take a look on www.royensoc.co.uk/shop and see what you can find to take your insect interest to a whole new level. Visit today!

The RES Handbooks are also available online at:
www.royensoc.co.uk/publications/handbooks
to receive your membership discount you need to be logged into the website.



Royal Entomological Society
www.royensoc.co.uk/shop

Diary

Details of the Meetings programme can be viewed on the Society website (www.royensoc.co.uk/meetings) and include a registration form, which usually must be completed in advance so that refreshments can be organised. Day meetings typically begin with registration and refreshments at 10 am for a 10.30 am start and finish by 5 pm. Every meeting can differ though, so please refer to the details below and also check the website, which is updated regularly.

Offers to convene meetings on an entomological topic are very welcome and can be discussed with the Honorary Secretary.

MEETINGS OF THE ROYAL ENTOMOLOGICAL SOCIETY

Climate Change Special Interest Group

Friday, December 14, 2018 - 09:00

"Understanding the past and predicting the future"

Venue: University of Birmingham

Convenor: Scott Hayward, University of Birmingham (s.a.hayward@bham.ac.uk)

Keynote speakers:

Prof Pete Convey (British Antarctic Survey)

Dr Deepa Senepathi (University of Reading)

South East Regional Meeting

Wednesday, January 9, 2019 - 09:00

Insects: Tools for Life and Death

Venue: University of Greenwich (Greenwich Maritime campus).

Convenor: Sarah Arnold, s.e.j.arnold@greenwich.ac.uk

Invited speaker: Dr Damien Charabidze (Lille University)

Verrall Lecture

Wednesday, March 6, 2019 - 16:30 to 17:30

Venue: The Flett Theatre, Natural History Museum, London, SW7 5BD.

Marie Dacke, Professor of Sensory Biology, Lund University, Sweden

As the crow flies and the beetle rolls: Straight-line orientation from behaviour to neurons

2019 PG Forum

Thursday, March 21, 2019 - 09:30 to Friday, March 22, 2019 - 16:00

Venue: University of York

PG Representatives: Roberto Padovani, Adam Bakewell and Molly Rogers

Insects as Food & Feed Special Interest Group

Tuesday, April 2, 2019 - 10:00 to Wednesday, April 3, 2019 - 16:00

Venue: Royal Agricultural University, Stroud Road, Cirencester, GL7 6JS

Convenors:

Peter Smithers (p.smithers@plymouth.ac.uk)

Mark Ramsden (mark.ramsden@adas.co.uk)

Aphid Special Interest Group

Wednesday, April 3, 2019 - 14:00 to Friday, April 5, 2019 - 14:00

Venue: Rothamsted Research, Harpenden, AL5 2JQ

Convenor: Richard Harrington, RES SIG coordinator richard@royensoc.co.uk

This will be a joint meeting with The French Aphid Research Network (BAPOA).

Invited speakers confirmed:

Prof. Tsutomu Tsuchida, University of Toyama, Japan

Dr Julie Jaquiéry, INRA Rennes, France

Dr James Bell, Rothamsted Research, UK

Insect Parasitoid Special Interest Group

Tuesday, April 9, 2019 - 10:00

Venue: Newcastle University.

James Kitson (Convenor) (James.Kitson@newcastle.ac.uk)

Fifth Annual Forest Insect Group Meeting

11th April 2019

Hosted by the University of Birmingham
at their BlfoR FACE facility in Staffordshire

Arthropod Cuticle Special Interest Group

Tuesday, April 16, 2019 - 09:00

Venue: Flett Lecture Theatre, Natural History Museum, London

Convenor: Stuart Reynolds (s.e.reynolds@bath.ac.uk)

Insect Endosymbiont Special Interest Group

Thursday, April 25, 2019 - 09:30

Venue: University of Nottingham on the 25th & 26th April.

Infection & Immunity Special Interest Group

Friday, April 26, 2019 - 09:30

Venue: University of Nottingham on the 25th & 26th April.

The organising committee includes Ella Deutsch, Alastair Gibbons, Sara Goodacre and Tamsin Majerus.
Please contact insectinfect19@gmail.com with any enquiries.

Annual General Meeting

Wednesday, June 5, 2019 - 14:00 to 16:00

The Royal Entomological Society Annual General Meeting, open to Members & Fellows ONLY.
The Mansion House, Choswell Green Lane, St Albans, AL2 3NS

OTHER MEETINGS

2020

19-24 July XXVII International Congress of Entomology (ICE2020)

Entomology for our planet

Venue: Helsinki, Finland



author guidelines

We are always looking for new material for *Antenna* – please see below if you think you have anything for publication

AIMS AND SCOPE

As the Bulletin of the Royal Entomological Society (RES), *Antenna* publishes a broad range of articles. Articles submitted to *Antenna* may be of specific or general interest in any field related to entomology. Submissions are not limited to entomological research and may, for example, include work on the history of entomology, biographies of entomologists, reviews of entomological institutions/methodologies, and the relationship between entomology and other disciplines (e.g. art and/or design).

Antenna also publishes Letters to the Editor, Meeting Reports, Book/App/Website Reviews, Society News, Obituaries and other items (e.g. selected Press Releases). *Antenna* further includes details of upcoming entomological meetings in its Diary Section and features information and reports on RES activities including National Insect Week, Insect Festival and National, Regional and Special Interest Group meetings. Details of RES Awards and recipients are also covered, as is notification of new Members (MemRES), Fellows (FRES) and Honorary Fellows (HonFRES).

READERSHIP

Antenna is distributed quarterly to all Members and Fellows of the RES, as well as other independent subscribers.

INSTRUCTIONS FOR AUTHORS

Standard articles are normally 2,000-6,000 words in length, though shorter/longer submissions may be considered with prior approval from the Editorial Team. The length of other submitted copy (e.g. Letters to the Editor and meeting reports) may be shorter, but should not normally exceed 2,000 words. The use of full colour, high quality images is encouraged with all submissions. As a guide, 4-8 images (including figures) are typically included with a standard article. Image resolution should be at least 300 dpi. It is the responsibility of authors to ensure that any necessary image permissions are obtained. Additional supplementary material may also be submitted for consideration for publication on the members area of the RES website.

Authors are not required to conform to any set style when submitting to *Antenna*. Our only requirement is that submissions are consistent within themselves in terms of format and style, including that used in any reference list.

PAGE CHARGES

There is no charge for publication in *Antenna*. All articles, including images, are published free-of-charge in full colour, with publication costs being met by the RES for the benefit of its membership.

REVIEW AND PUBLICATION PROCESS

All submissions are reviewed and, where necessary, edited 'in-house' by the *Antenna* Editorial Board, though specialist external review may be sought in some cases (e.g. for submissions that fall outside the Editorial Board's expertise). Receipt of submissions will be provided by email, with submitting authors of accepted articles being offered the opportunity to approve final pdf proofs prior to publication. Where appropriate, authors will be requested to revise manuscripts to meet publication standards.

SUBMISSION PROCESS

All submissions should be sent electronically to 'antenna@royensoc.co.uk', preferably in MS Word format with images sent as separate files (see above). Image captions and figure headings should be included either with the text, or as a separate file.

EDITORIAL BOARD

Editor: David George (Stockbridge Technology Centre)

Editor: Richard Harrington (Rothamsted Research)

Editorial Assistant: Jennifer Banfield-Zanin (Stockbridge Technology Centre)

Consulting Editor: Jim Hardie (RES)

Assistant Editors: Adam Hart (University of Gloucestershire), Peter Smithers (University of Plymouth), Hugh Loxdale (Cardiff University), Tom Pope (Harper Adams University), Alice Mockford (University of Worcester)



**Royal Entomological Society
- Society Awards -**

For more details on these Society Awards please see www.royensoc.co.uk

**THE ROYAL ENTOMOLOGICAL SOCIETY
STUDENT AWARDS**

Award Criteria: Any article about an entomological topic that would be of interest to the general public. The article to be easy to read, in a popular style and no longer than 800 words.

Prize: Winner £400, runner up £300, third place £200, all three articles published in *Antenna*.

**THE L.J. GOODMAN AWARD
FOR INSECT BIOLOGY**

Award Criteria: For advancing the education of the public in the knowledge, understanding and appreciation of all aspects of insect physiology and behaviour, thereby promoting the control and conservation of insect species.

For promoting research into aspects of insect physiology and behaviour through online, digital or printed material.

For supporting exhibitions, meetings, lectures, classes, seminars and courses that widen the understanding of insect physiology and behaviour.

Grant: No individual award shall exceed £3,000 and not more than £6,000 shall be awarded each year.

**THE MARSH AWARD FOR INSECT
CONSERVATION**

Award Criteria: For an outstanding contribution to insect conservation; on the basis of 'Lifetime Achievement', or 'Considerable and Exemplary Contribution' to a significant project or undertakings. In exceptional circumstances two prizes may be awarded to reflect each criterion.

Prize: £1250 and certificate.

**THE ALFRED RUSSEL WALLACE AWARD
POSTGRADUATE AWARD**

Award Criteria: For postgraduates who have been awarded a PhD, whose work is considered by their Head of Department to be outstanding. The research involved should be a major contribution to the science of entomology.

Prize: £800 plus certificate, plus one year's free membership. The winner will also be invited to present their work at a Society Meeting.

**J.O. WESTWOOD MEDAL –
AWARD FOR INSECT TAXONOMY**

Award Criteria: The best comprehensive taxonomic work on a group of insects, or related arthropods (including terrestrial and freshwater hexapods, myriapods, arachnids and their relatives). Typically, this will be a taxonomic revision or monograph.

Prize: A specially struck silver gilt medal inscribed with the winners name. Also costs incurred in attending the International Congress of Entomology, European Congress of Entomology, or other major meeting (specified by the adjudicators) to present his/her work.

RES JOURNAL AWARDS SCHEME

Award Criteria: The best paper published in each Society Journal over a two year period. Each of the Society Journals participates biennially.

Prize: £750 and certificate for each participating Journal.

**THE WIGGLESWORTH MEMORIAL LECTURE
AND AWARD**

Award criteria: The outstanding services to the science of entomology. The award will be made to a researcher who has contributed outstanding work to the science and who best reflects Sir Vincent Wigglesworth's standards of personal involvement in every aspect of his/her research.

Prize: A specially struck gilt medal inscribed with the winner's name. Also the costs of attending the International Congress of Entomology to give the Wigglesworth Lecture.

**BOOK PURCHASE SCHEME FOR FELLOWS
AND MEMBERS IN DEVELOPING COUNTRIES**

Award Criteria: To provide assistance in purchasing specialist taxonomic books, that will assist in the identification of insect groups being studied in developing countries and their regions. Applicants will be required to demonstrate need and specify particular texts.

Prize: Any one applicant may be awarded up to £250 in a three year period. The Society will purchase the texts awarded and send them to the applicant. The applicants may, themselves, provide any additional funds in excess of the amount awarded.

**OUTREACH AND CONFERENCE
PARTICIPATION FUNDS**

Award Criteria: ORF: Grants to support activities which further the Society's aims. This may range from, help to purchase equipment, to help in funding expeditions/meetings. CPF: Grants to assist applicants who are participating in a meeting or conference in some way, e.g. presenting a paper/poster.

Prize: ORF: Monetary grant. CPF: Monetary grant.

**MARSH AWARD FOR EARLY CAREER
ENTOMOLOGIST**

Award Criteria: For an early career contribution to entomological science that is judged to be outstanding or exemplary with single or ongoing impact on the science. The award is 'open' and not restricted to any particular discipline or specialised area of entomological science.

Prize: £1250 and certificate.

Royal Entomological Society
www.royensoc.co.uk

The Mansion House, Chiswell Green Lane, St. Albans, Herts AL2 3NS, UK
Tel: +44 (0)1727 899387 • Fax: +44 (0)1727 894797
E-mail: info@royensoc.co.uk

RES STUDENT AWARD 2018

Write an entomological article and WIN!



www.royensoc.co.uk

REQUIREMENT

Write an article about any Entomological topic that would be of interest to the general public. The article must be easy to read and written in a popular style. It should be no more than 800 words in length.

WHO CAN ENTER?

The competition is open to all undergraduates and postgraduates, on both full and part-time study.

PRIZES

First Prize: A £400 cheque and your article submitted for inclusion in *Antenna*.

Second Prize: A £300 cheque and your article submitted for inclusion in *Antenna*.

Third Prize: A £200 cheque and your article submitted for inclusion in *Antenna*.

ENTRIES

You can send electronically via e-mail to: kirsty@royensoc.co.uk

Alternatively, complete the attached entry form, and submit it with five copies of your entry to:

The Registrar,
Royal Entomological Society,
The Mansion House,
Chiswell Green Lane,
St Albans, Herts
AL2 3NS

For further information telephone:
01727 899387

Please include:

- Your name and address (including postcode)
- Your e-mail address
- The name and address (including postcode) of your academic institution
- Evidence of your student status

THE JUDGES

The judges panel will be made up of three Fellows of the Royal Entomological Society. The judges decision is final.

CLOSING DATE

The closing date for entries is 31 December 2018. The winner will be announced in the Spring 2019 edition of *Antenna* and on our website.

PLEASE CUT AND RETURN THIS PORTION WITH YOUR ENTRY

Article title: _____

Student name: _____

Address: _____

Telephone: _____

E-mail: _____

Name of academic institution:
