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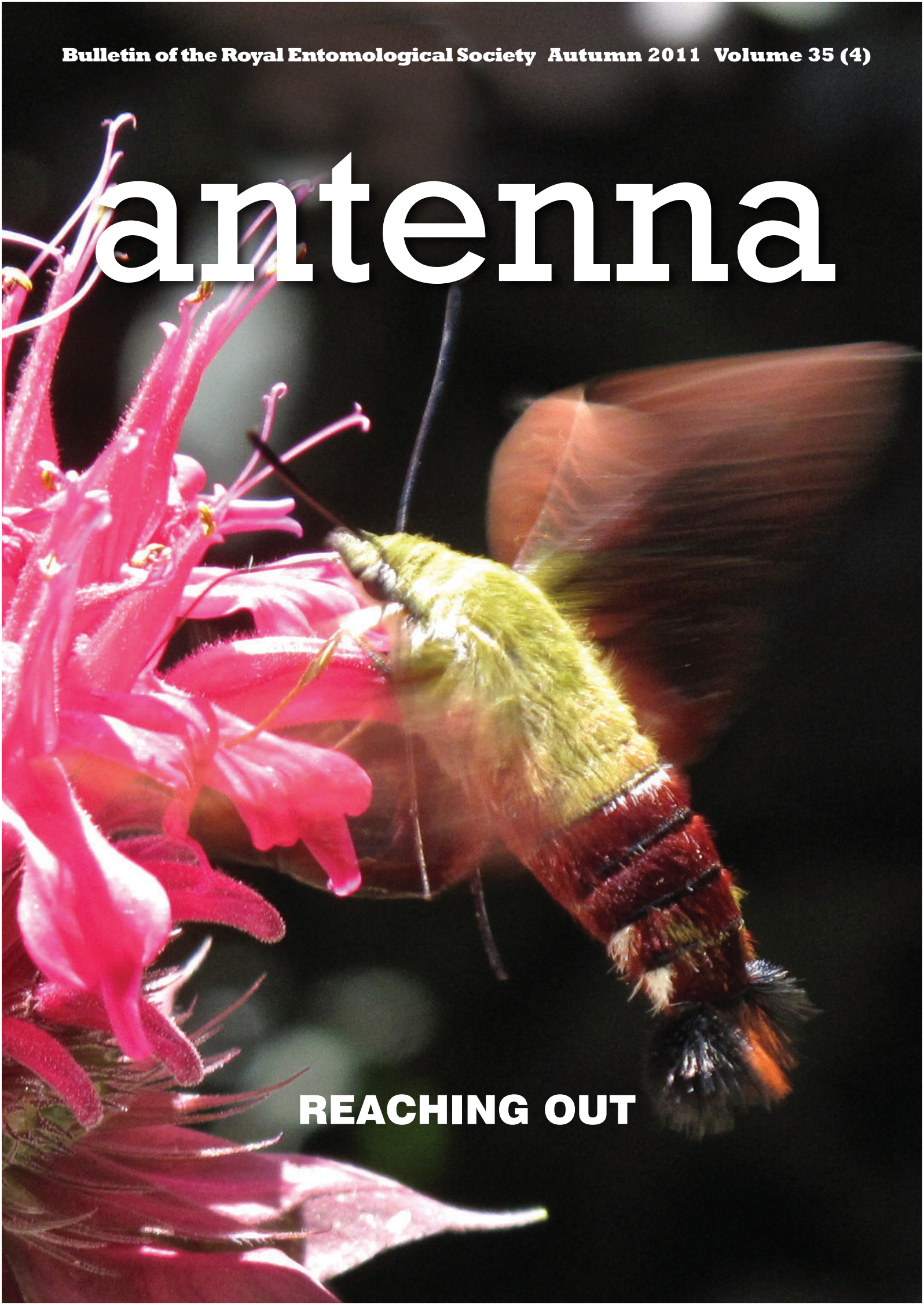

REACHING OUT

meetings of the society

for more information on meetings and contact details see meetings page on www.royensoc.co.uk

2012

Feb 1-2	Postgraduate Forum **Venue: University of Liverpool** Convenor: Mr Steven Parratt
Mar 7	Verrall Lecture **Venue: Flett Lecture Hall, Natural History Museum** Professor Ilkka Hanski (University of Helsinki) on the topic of: The Glanville fritillary butterfly: ecology meets evolution
May 10	Insect Ecology Special Interest Group Meeting (Insect-Fungus Interactions) **Venue: Rothamsted Research** Convenor: Dr Michael Bonsall
Jun 6	**RES Annual General Meeting**
Jun 25 – 1 Jul	**National Insect Week**
Jul 18 – 20	Ento'12 – the National Meeting of the RES **Venue: Anglia Ruskin University, Cambridge** Convenor: Dr Alvin Helden
Aug 19 – 25	ICE 2012 - XXIV International Congress of Entomology **Venue: Daegu, Korea**

Special Interest Group meetings occupy either a whole day or an afternoon (check www.royensoc.co.uk for details).

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COVER PICTURE

Hummingbird Hawkmoth feeding, taken in North Carolina by freelance artist, Sam Causon (www.recentrunes.deviantart.com)

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Bulletin of the Royal Entomological Society

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EDITORIAL

Thoughts on outreach

This issue of *Antenna* focuses on outreach activities. The following pages contain articles on a diverse and quite staggering collection of insects in a Swiss museum, an expedition to Papua New Guinea, expedition and meeting reports, the Verrall, a very wide ranging number of book reports, a reminder about next year's National Insect Week, the Insect Festival and the diary of meetings. All of these are examples of outreach. They are also reminders of some of the activities that our Society is engaged in.

But, what of outreach... How many of us try explaining and justifying what we do to the public (after all, don't they pay the salary of most of us?), to our parents, grandparents or our children? How do you get a teenager interested in entomology? They are the future, the next scientists, innovators, educators and of course Society members. One needs to spark their imagination, think of new angles, new ways of communicating, using the right language in the right way via the right medium. To my mind it is important to sideline our personal biases and opinions about facebook and twitter for example, if that is the media that our audience uses then we should use it too in reaching out... That is not to say that there is anything wrong with a debate, a whiteboard or a lecture. All have their place, all are effective.

Many of these themes are explored in the opinon article by Adam Hart, Peter and myself. Adam's biography is included in the article and he is a skilled communicator and entomologist. Adam has agreed to be Outreach Editor for *Antenna*, featuring who's doing what, people's experiences snd highlighting outreach activity by the Society and others. I would personally like to thank Adam for taking on this role and on behalf of *Antenna* welcome him onboard.

As always you can contact us, including Adam through Antenna@royentsoc.co.uk.

I hope you enjoy this bumper packed issue, and let's all think about what outreach we can do, who to encourage and even what we can do for National Insect Week.

Greg Masters

Adam Hart reaching out.

Photo: Judy Green

CORRESPONDENCE

Species names and the ICZN Code

Dear Editor,

I thoroughly endorse Dick Vane-Wright's support for the ICZN (*Antenna* 35(3)). However, having refereed numerous ecological papers over the years and as co-editor of 30 volumes of the *Naturalists' Handbooks*, I have become acutely aware that the Code upholds two provisions that are a cause of confusion and irritation to non taxonomic colleagues. The more serious is the requirement that the ending of the specific epithet must agree in gender with that of the generic name, in accordance with the requirements of Latin. This applies even when the names concerned are Latinized Greek or some other language. When a species is transferred from one genus to another the Code requires that one changes its ending if the new genus is of a different gender. The result is that many ecologists and others think *X. punctipennis* Smith is a different species from *Y. punctipennem* (Smith). The second, less important source of confusion, is the consequence that the author of the original specific epithet is now in brackets. Much confusion would be avoided if the ending of the specific epithet were to be fixed regardless of subsequent changes in the generic assignment of the species. After all they are not Latin names but Latinized names. Whether the name of author of the specific epithet is in brackets or not does not affect the interpretation of a text, but many ecologists and other non taxonomists have no idea as to when brackets are required.

Henry Disney

Overseas Field Guides

Dear Editor,

In Vol. 35 part 3 you asked for listings of insect field guides for entomologists travelling overseas. The following may be of use to those planning visits to S E Asia, in respect of Lepidoptera:

Thailand

Butterflies

Pisuth Ek-Amnuay (2006). *Butterflies of Thailand*. English ed. 868 pp. including more than 388 col. pl. Available from Pemberley Books, U.K. About £55. Comprehensive coverage.

Moths

Bro. Amnuay Pinratana & others (1990-2006). *Moths of Thailand*. Vols. 1-6 covering larger moths so far. Many col. pl. Published by Brothers of St Gabriel in Thailand, 565 Samsen Rd., Bangkok 10300, Thailand.

Malaysia

Butterflies

Corbet, A.S. & Pendlebury, H.M. 4 ed. by J.N. Eliot. 1992. 63 col. pl. *The Butterflies of the Malay Peninsula*. Comprehensive coverage.*

Moths

Holloway, J.D. (1983-2011). *The Moths of Borneo*. 18 vols. All species illustrated with col. pl. Coverage per attachment. For practical purposes this will enable 80-90% of macro-moths occurring in S.E. Asia to be identified, at least to genus.*

Barlow, H.S. (1982). *An Introduction to the Moths of South East Asia*. 50 col. pl. Covers about 500 of the commoner species. Now out of print, with nomenclature in some cases changed, but worth looking for second hand <www.abebooks.com> as a useful general introduction.

Robinson, G.S., Tuck, K.R. & Shaffer, M. *A Field Guide to the Smaller Moths of South East Asia*. 32 col. pl. An extremely useful introduction to the commoner microlepidoptera of S E Asia.*

Sumatra

Moths

Heterocera Sumatrana. 1983-2007, 12 volumes include. numerous fascicles. Various authors. Published by Verlagder HSS eV 6 Kreuzberger St. D-37085 Goettingen, Germany.

* Available from hsbar@pc.jaring.my Please email for quote.

I hope this may be of some use to lepidopterists travelling to S.E. Asia.

Henry Barlow

Dear Editor,

In answer to your call for books dealing with insects in different areas of the world, I submit the following incomplete list. The first book treats not only the insects but the entire macroscopic biota of a large mountainous area of California measuring 100 by 500 miles. This remarkable book was written and illustrated with over 2700 full colour illustrations by a graduate in Conservation Studies at the University of California, Berkeley. Included are fungi, lichens, ferns, trees, wildflowers, other plant life, insects [butterflies and moths, 15 pages; beetles, 12 p.; bugs, 2 p.; flies, 4 p.; wasps, ants and bees, 5 p.; other insects, 3 p.; galls, 2 p.; and aquatic insects, 11 p.], other aquatic organisms, spiders and other terrestrial arthropods, fish, amphibians, reptiles, birds, mammals and their scats and tracks, weather, and 8 star charts. This book might well serve as a model for other field guides.

1. *The Laws Field Guide to the Sierra Nevada*, 2007, by John Muir Laws, California Academy of Sciences, 366 pp. Order from: Heyday Books, P.O. Box 9145, Berkeley, CA 94709
2. *California Insects*. 1979, by Jerry A. Powell and Charles L. Hogue, 388 pp. Order from University of California Press, Berkeley 94720. About 600 species are described and illustrated with line drawings and colour photographs.
3. *Western Butterflies*. 1999, by Paul A. Opler and Amy Bartlett Wright, 540 pp. The Peterson Field Guide Series. Covers 590 species in western North America. Illustrated by photographs and colour plates.
4. *A Field Guide to Insects: America North of Mexico*, 1998, by Donald J. Borror and Richard E. White (Apr 15, 1998) The Peterson Field Guide Series.
5. *A Field Guide to Eastern Butterflies (Peterson Field Guide)*, 1998, by Paul A. Opler and Vichai Malikul. The Peterson Field Guide Series., 987 pp.
6. *A Field Guide to the Beetles of North America*. 1983, by Richard E. White, 368 pp. The Peterson Field Guide Series.
7. *A Field Guide to Moths of Eastern North America*, by Charles V. Covell. The Peterson Field Guide Series
8. *Kaufman Field Guide to Insects of North America (Kaufman Field Guides)*. Kenn Kaufman
9. *The Audubon Society Field Guide in North American Insects and Spiders*. 1980, by Lorus and Margery Milne, 989 p.
10. *New Holland Concise Insect Guide*. New Holland Publishers, 192 pp.
11. *Know your New Zealand Insects and Spiders*, John Early. New Holland Publishers
12. *New Holland Concise Butterfly and Moth Guide*. New Holland Publishers. Britain and near Continent.
13. *Know Your New Zealand Insects and Spiders*. New Holland Publishers
14. *Green Guides: Butterflies of Britain and Europe*
15. *Nick Baker's Bug Book*
16. *Ivor Migdoll's Field Guide to the Butterflies of Southern Africa*.1992, 256 pp, by Ivor Migdoll. New Holland Publisers.
17. *Collins Guide to the Insects of Britain and Western Europe*, 1986, Michael Chinery. Collins, London.
18. *A Field Guide to the Butterflies of Britain and Europe*, 1983. L. G. Higgins and N. D. Riley, Collins, London.
19. *The Wildlife Trusts Guide to Insects*, 202 pp. By Sandra Doyle and Stuart Daarter. New Holland Publishers (UK) Ltd.
20. *The Wildlife Trusts Guide to Butterflies and Moths*, New Holland Publishers (UK) Ltd.

Howell V. Daly

Erratum

Dear Editor

I was just looking at the article Insects in Meso American art in the latest *Antenna*. Fig. 1 is obviously not a monarch butterfly but almost certainly *Papilio multicaudatus* and Beutelspacher's book "Las Mariposas entre los Antiguos Mexicanos" (Tezontle, Mexico City 1989) gives many examples to support this conclusion.

Hope this is helpful

Philip Howse

Dear Editor

In your interesting article in *Antenna* you correctly describe the migration of the Monarch butterfly but have been misinformed as to the identity on the vase, Fig 1., which is a Swallowtail, not a Danaid.. There is a similar image, Fig 58, in Beutelspacher`s "Las Mariposas entre los Antiguos Mexicanos" where it is identified as *Papilio multicaudatus*.

Brian Gardiner

Dear Editor

I have seen a copy of *Antenna* and need to point out another mistake (besides my own one about the Monarch which is in reality a Swallowtail).

Erratum to Insects in mesoamerican art part 1.

The copyright is attributed as being "all images (c) of Trustees of the British Museum" but in reality only Figure 1 is.

The rest, with the exception of Figure 7 (Tozzer, 1910) are all my own illustrations.

Also, my address has changed to 97 Crouch Hill, London, N8 9EG.

Michele Woodger

Figure 1 from Insects in the Art and Mythology of Ancient Mesoamerica (Part 1) *Antenna* 35(3): 97

No golden age: competing with insects for food and the origins of agriculture

Stuart Reynolds

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We compete with insects for our food. Every crop cultivated by humans is attacked by one or more insect pests. Even after it is harvested and home, the crop is not safe from the attentions of insects. How long has this antagonism between people and insects been going on? Longer than you think! Even before farming was invented, insects and people were competitors.

Our own species, *Homo sapiens*, evolved in Africa as an omnivorous, social primate, with a life style probably similar to that of the few remaining human hunter-gatherer societies (although we have to be cautious in assuming this, as modern foragers are influenced by neighbouring farmers). Today, most hunter-gatherers (for example the San of Southern Africa) live almost entirely in infertile near-deserts, but this is mostly because their societies have been displaced to agriculturally undesirable land (Marlowe, 2005). They live at very low densities, as much as 100,000 times lower than those supported by today's intensive agriculture (Smil, 2000). 20,000 and more years ago, before the invention of farming and with few serious predator enemies, hunter-gatherers would have exploited much more productive ecosystems. There, they probably lived at higher density, and were so successful that they had colonised every continent of the world, but even so, many fewer humans could be supported by foraging than by farming.

Ranging widely over an extensive range of natural ecosystems, modern hunter-gatherers exploit a wide variety of both plant and animal foods. At the low latitudes where humans originated, gathered (mostly plant) food constitues the most important part (~ 60%) of the diet (Marlowe, 2005). A huge range of plants is eaten, typically ca. 100 species, with fruits, seeds, tubers, nuts, roots and bulbs, leaves, flowers, gums, and other miscellaneous plant parts more or less in that order of importance (Cordain *et al.*, 2000). Notice that green parts of plants figure as only minor components of this diet.

This conjectural pre-agricultural human diet is strikingly different from what most people eat today. Although a wide variety of other plant foods is available in food markets, just three cereal seeds (maize, wheat, rice), dominate plant food production worldwide. These three crops between them represent more than half (51.4%) of all plant foods produced (FAO, 2011a). All of these "big three" cultivated plants are grasses (Poaceae).[1]

Given that hunting and gathering seemed to work quite well, why and how did agriculture arise? It's interesting to consider the costs and benefits of converting to an agricultural way of life. As an entomologist, I naturally focus on the undisputable fact that humans compete for food with "pest" insects. Present day farming has many problems, and it's tempting to suppose, as many commentators do, that insect pests have actually been created by agriculture. In this view, pre-agriculturalists lived in a golden age without pests. But as I will show, this was not so. This makes sense, as if the insect pest problems associated with agriculture were so much worse than foraging wild plants, it doesn't make sense that foragers would have chosen to become farmers. I will argue that there was no golden pest-free age. Although hunter-gatherers may indeed not have needed to worry much about the specialist pests of particular plants that trouble us today, they would have been very concerned indeed about generalist migratory insects, and also about insects that attack stored seeds.

Of course, even before agriculture there were plenty of insects, then just as now. Herbivorous insects are still numerous and diverse, and significantly reduce plant productivity. It has been estimated (McNaughton *et al.*, 1989; Cyr and Pace, 1993) that in natural terrestrial ecosystems roughly 18% of aboveground primary production and 13% of belowground production (i.e. plant growth) is removed or otherwise destroyed by herbivores, notably insects, so assuming that overall the extent of insect damage to plants in natural systems then was roughly similar to now, the conclusion must be that around one sixth of the plant food that could otherwise have been eaten by pre-agricultural people was taken. This is obviously a rough and ready calculation, since only a minority of plants are edible, and the ones that are desirable may be damaged to less or more than the average extent. The figure is actually very similar to the 16.9 % "potential losses" (i.e what would happen if crop protection measures were not taken) calculated from figures given by Oerke (2006) for present day world crops of wheat, rice, and maize. This leads to the conclusion that agricultural systems are probably not intrinsically more susceptible to pests than natural ecosystems, as is often supposed.

But the pattern of damage may have been different to that occurring in farming systems. It was probably more evenly distributed than typically occurs in farming systems. Today, bad damage to agricultural crops is mostly caused by pest population surges or "outbreaks". Each of the "big three" modern crop plants has its own dedicated insect pests, such as western corn rootworm *Diabrotica virgifera* (Coleoptera: Chrysomelidae) on maize, hessian fly (Diptera, Cecidomyiidae) on wheat , and the stem borer *Chilo suppressalis* (Lepidoptera: Pyralidae) on rice; this list is far from exhaustive, and these crops all suffer from more than one specialist pest. It has been known for a long time (Voûte, 1946) that outbreaks of pests like these are associated mainly with agricultural systems, and this is attributed to the lower biodiversity and simpler spatial structure of farmer's fields, which harbour fewer natural enemies (Root, 1973). This inverse dependence of herbivore populations on plant diversity has been confirmed experimentally for specialist insect herbivores (Andow, 1991), and is also seen in natural grassland systems for generalists (Unsicker *et al.*, 2006).

Put simply, without agriculture, outbreaks of specialist insect pests of food plants would have been rare in pre-agricultural times because these plants did not exist in large monocultural stands, and their richly biodiverse environment would have included "good insects" to keep specialist "bad insects" in check. Pre-agricultural foragers therefore didn't need to worry much about this type of pest, because populations of such insects did not build up so easily. Even if specialist herbivores did manage to reduce the productiveness of some favoured human food plant, hunter-gatherers typically spread their bets. If damage to one plant was bad, then foragers with a large repertoire of foods could always eat something else.

So was this a golden age of minimal competition with insects? No. This is because it's probable that generalist (i.e. polyphagous) migratory insects posed a relatively more serious serious problem to pre-agricultural people than is the case now. Two paradigmatic species are the desert locust *Schistocerca gregaria* (Orthoptera, Acrididdidae) and the African armyworm, *Spodoptera exempta* (Lepidoptera: Noctuidae). The ability of these insects to decimate crops is legendary. We don't know the extent to which they were a problem in pre-agricultural times. But long ago they certainly were a scourge of early pastoralist societies of the middle East. There are many biblical mentions of these insects. Here is just one about both caterpillars and locusts, from (probably) around 3000 years bp: "*That which the palmerworm hath left hath the locust eaten; and that which the locust hath left hath the cankerworm eaten; and that which the cankerworm hath left hath the caterpillar eaten.*" (Bible, 2008: Joel, 1:4). Outbreaks of another locust, the Oriental migratory locust, *Locusta migratoria manilensis* were notable enough to be mentioned in the official dynastic records of China, and have been traced back almost 2000 years; the earliest mention of this insect has been found in an inscription on an ox bone from 3,500 years ago (Tian *et al.*, 2011).

Of course, migratory insect pests are still a problem for farmers today. When they occur, outbreaks of locusts are highly damaging, sometimes leading to total loss of an affected crop (Bullen, 1966). Despite considerable efforts to predict and control them, plagues of these insects are not rare. There were four major outbreaks of desert locusts in North Africa during 1910-1960 (Sword *et al.*, 2010) and armyworm outbreaks occur even more frequently in East Africa (Dewhurst *et al.*, 2001). Desert locusts *S. gregaria*, African migratory locusts *Locusta migratoria*, red locusts *Nomadacris septemfasciata*, Brown locusts (*Locustana pardalina*), and Moroccan locusts *Dociostaurus maroccanus* all still break out in Africa, the Middle East and Southwest and Southern Asia, and anecdotal accounts of the havoc they cause occur throughout recorded history. Outbreaks of gregarious forms of the locust *Chortoicetes terminifera* still occur in Australia (Gray *et al.*, 2009). Migratory polyphagous armyworms *Spodoptera* spp. occur not only in Africa (*S. exempta*), but also Europe and Asia (*S. exigua*) and North and South America (*S. frugiperda*). Other noctuid moths that migrate to cause pest outbreaks include *Trichoplusia ni* and *Helicoverpa zea* in North America and *Mithymna separata* in Asia. Other notable highly damaging migrant insects include the Mormon cricket, *Anabrus simplex*, actually a tettigonid grasshopper and not a true cricket at all. Despite being highly cannibalistic, these insects are still extremely destructive to the vegetation of North America's great basin (Bazazi *et al.*, 2010). The migratory planthoppers *Sogatella furcifera* and *Nilaparvata lugens* (Homoptera: Delphacidae) are also very damaging, both attacking rice over large areas of Asia (Otuka *et al.*, 2008).

We don't know how often migratory insect pest outbreaks occurred in pre-agricultural ecosystems. The timing of outbreaks is determined largely by

et al., 2007; Tian *et al.*, 2011) and occur when the insects respond to crowding by developing a gregarious, migratory phenotype (Pener & Simpson, 2009). The effect can persist over generations, perhaps through epigenetic mechanisms. Outbreaks occur in "hotspot" areas which equate more or less with extensive grasslands, and whose location is determined by climate, vegetation, and the spatio-temporal patterns of plant growth (Despland *et al.*, 2004). But significantly, all the indications are that outbreaks of pests like this would have occurred pre-agriculturally just as they do now. The permanent grasslands from which outbreaks of migrants spread existed before agriculture. They were not created by people (Strömberg, 2011) but evolved through a combination of highly seasonal rainfall, the restriction of woody plant invasion by a combination of wild large mammal grazing and seasonal bushfires, and the selective advantage to the grassy phenotype of basal meristems that can regenerate quickly from both heavy grazing and fire. The high productivity of grasslands, together with easier hunting of game, would have been attractive to pre-agriculturalists, but the same locations would already have been afflicted by periodic outbreaks of migratory insects even before people reached them.

But unlike specialist pests, it doesn't seem as though modern agriculture is more afflicted by migratory generalists; if anything, the problems with at least some of these pests have receded. This is because cultivation has encroached on the specialist breeding grounds of these insects. An example of a migratory pest that was definitely worse in pre-agricultural times is the Rocky Mountain locust, *Melanoplus spretus*, an acridid whose taxonomic status as a distinct species remains uncertain (Chapco and Litzenberger, 2004). The North American prairies were once subject to frequent and huge plagues of this insect. These were documented during the nineteenth century during the westward movement of pioneer farmers. From 1850-1880 periodic outbreaks of *M. spretus* affected most of the Western USA, reportedly covering as much as 5 x 10^5 km^2 at a time. The presumed extinction of this insect by 1903 remains mysterious, but was probably related to habitat modification as pioneer farmers put the prairie under the plough and destroyed essential oviposition areas (Lockwood and DeBrey, 1990). This episode shows that agricultural ecosystems are not necessarily worse than natural ones as far as pests are concerned.

Of course, it is still necessary to work hard at monitoring outbreak areas for signs of population build-ups of migratory insect pests (FAO, 2011b). And if you are a modern farmer hosting a visit from a plague of caterpillars or grasshoppers, then you might think that the situation is still pretty bad. But generalist migrant insect outbreaks were probably at least as bad, if not worse, in pre-agricultural times.

To what extent would pre-agriculturalists have been affected when these migratory insect outbreaks occurred? The bad news is that outbreaks almost always occur when the rains have been good (Tian *et al*, 2011), so that just when you think that there should be plenty of food, there isn't. Locusts arrive just as plants are growing. The modern experience is that if a plague arrives at just the wrong stage of plant development, then those plants will be totally lost. But at other stages of growth, some plants will not be killed outright, and will recover to give at least a reduced yield (Bullen, 1966). This stage-dependent effect would have helped pre-agriculturalists, who could feed on many different plants, but as we will see below, these people also often gathered and stored seeds from extensive stands of wild grasses. To lose the plants that would later produce these seeds to a locust plague before the harvest would have been a disaster. If you're reliant on what you can gather, then the arrival in your territory of a plague of locusts would at the very least have caused you to thinking about moving somewhere else for dinner. At worst it could have wiped out whole human populations.

So migratory insect outbreaks must have been very bad for pre-agriculturalists. The essence of human ingenuity, however, is turning a crisis into an opportunity. In this vein, I'd like to speculate that the periodic food shortages produced by migratory insect outbreaks may have been an important driver for the invention of agriculture. There are two reasons for this suggestion.

First, the most damaging African locust, *S. gregaria*, may have made the domestication of ruminant animals (especially cows and sheep) particularly advantageous. In the old world, swarms of the desert locust would have been especially feared because this insect is polyphagous; *S. gregaria* eats a wide range of vegetation, whereas its extensively distributed but less damaging relative the migratory locust, *L. migratoria*, will take only grasses (Raubenheimer and Simpson, 2003). Despite this, using stable isotope analysis, Sánchez-Zapata *et al.* (2007) found that in the typical dry-country outbreak region of the African Sahel, swarming *Schistocerca* actually choose to feed mainly on the more tender leaves of C3 trees and shrubs. Since livestock feed largely on C4 species (mostly grasses), this means that today there is actually little competition for food between these insects and the domesticated ruminants of farmers. Among domesticated animals, only goats browse appreciably on C3 plants and compete with locusts. Like goats (but even more so) humans strongly prefer herbaceous green plants, and definitely don't eat grass (it isn't just a matter of preference – you need a specially adapted digestive system with symbiotic microbes to digest these exceptionally tough silica-reinforced plants).

Thus, the bad news is that a plague of desert locusts will eat much of the green food that you yourself would have liked to eat. Moreover, although humans don't actually eat much green stuff anyway (according to the FAO, green vegetables represent only 5.8% of today's plant production), and can manage completely without it for a while, those plants eaten by locusts would have eventually produced berries, roots and nuts, and even after the locusts have gone these products will be reduced in yield. But the good news is that because they eat grass, locally available ruminants (cattle,

can always eat beef or mutton (but not goat meat) if there is nothing else to eat. If you can control these animals by domesticating them, then so much the better. You may even be able to protect them against migratory insect outbreaks by harvesting and storing wild grasses as hay. Keeping animals can be seen as just another way of hedging your bets against locust-induced starvation.

Second, migratory insect outbreaks would have made the practice of long-term seed storage even more rewarding. Many modern hunter-gatherer societies cache food to keep over seasons when little wild food can be gathered. There is good evidence that pre-agricultural people did so too, sometimes on a considerable scale. For example, the seeds of numerous grasses (Ravedin *et al.*, 2010) and hazelnuts (Holst, 2010) were gathered by pre-agriculturalists for storage, being processed and consumed later. These food stores would also have improved the chances of surviving a migratory pest outbreak, especially if they could be stored over more than one growing season.

But storage of seeds was also a key step in the invention of agriculture (Zeder, 2006), not only because the technique of storage is a key technology for farming, but also because when proto-farmers began to keep back some of the stored seeds to replant, these plants became the ancestors of today's crops. This was because seed storage led to helpful genetic changes in these plants. An essential enabling feature of agriculture, repeated independently in a number of places from 12,000 years bp onwards (Zeder, 2008), was the selection of genetic traits (Purugganan and Fuller, 2009) from among those plants and animals that were already strongly associated with human pre-agricultural lifetsyles, and which permitted them to be exploited as food in a more consistent way (Dobney and Larson, 2006; Burger *et al.*, 2008). The selected traits were numerous, and it isn't necessary to assume that the proto-agricultural practices that caused this evolution were consciously directed towards achieving the "goal" of domestication. In other words, the selection may have been unintentional. This makes it much easier to see how agriculture could have evolved, since pre-agriculturalists could not have had preconsidered aims in developing the way that they gathered their food.

One of the best examples of unintentional selection relates to seed storage. Selection of a plant gene that reduced the extent of seed-shedding prior to or during havesting would have greatly facilitated domestication. A "non-shattering" gene with exactly these characteristics has been found in modern rice (Li *et al.*, 2006). Because "shattering" seeds would have been less likely to be collected when gathered, "non-shattering" seeds would have been present in high proportion in food stores. If in the next year, stored seeds that were surplus to requirements were discarded and allowed to germinate close to human settlements, the shattering kind would have increased in frequency in the next harvest. Moreover, once the practice emerged of keeping back a proportion of gathered seed to sow for next year's crop, seeds from non-shattering plants would rapidly increase in frequency, without any conscious effort to select for this trait. Many similar examples have been proposed of how agriculture unintentionally led to the evolution of present forms of both crop plants and farm animals (Harlan *et al.*, 1973; Dobney and Larson, 2006).

Thus, the risk of plagues of migratory insects may have led foragers to cache seeds as an insurance policy, and this may have unintentionally led to the development of enabling technology for farming. But why would anyone choose to be a farmer? It takes more work, not less, to be a farmer rather than a hunter-gatherer (Bowles, 2011), and archaeological finds show that the restricted diet that accompanied an agricultural way of life led early farmers to suffer worse health than the hunter-gatherers that preceded them (Cohen and Crane-Kramer, 2007). It isn't self-evident why anyone would volunteer for a way of life that produces less food for more effort, and provides worse nutrition.

Another view of agriculture is that it's all about food security, storing food for hard times and decreasing the risk of famine. The argument that I have developed so far is consistent with this; pest insects may have been a driving force in developing this way of life. When your food is eaten by migratory insects, it's good if you have a store of seeds from last year that the pests can't get at. The risk of plagues of locusts or caterpillars may therefore have played a key role in persuading people to take up the life of cultivators.

But whether you grow your food or just gather it, food storage brings its own insect problems. Pre-agriculturalists would have had serious problems with the same insect pests of stored cereal seeds that continue to trouble us today. It has long been known to archaeologists (Buckland, 1981) that many insect pests of stored products were already widespread in ancient times. But a recent discovery by Hiroki Obata of Kumamoto University in Japan provides strong evidence that they began their association with humans even before the invention of agriculture. One of the most damaging of stored product pests is the maize weevil, *Sitophilus zeamais*, an insect that despite its name is not uniquely associated with new world maize, and which probably originated in South Western Asia. Impressions of large numbers of these insects have been discovered (Obata *et al.*, 2011) in Japanese Jomon pottery from 10,500 years bp, a time that predates the local adoption of cereal agriculture. The jars were probably used to store acorns and bamboo seeds.

S. zeamais probably started out as a specialist consumer of wild tree seeds and nuts (e.g. bamboo seeds, acorns, chestnuts), and since a number of mammals (e.g. squirrels) and birds (e.g. corvids) (Smith and Reichman, 1984) collect and cache these seeds, this weevil was pre-adapted to colonize human seed and nut stores (Plarre, 2010). Only subsequently did it make the switch to stored cereal seeds, at the same time as humans first began to gather them from the wild, and later to grow them in recognizably agricultural regimes. Adaptation of the weevils to the most predictably available stored foods would have been favoured by selection. The insects found that the obliging humans would even provide transport that enabled them to spread

Today a number of *Sitophilus* spp. are pests of stored cereal seeds; there's good molecular evidence that these insects have all evolved from a single ancestor species since becoming associated with humans.

Particularly fascinating to me, is that a key step in the evolution of these beetles appears to have been the acquisition of an obligatory microbial companion (SOPE - *Sitophilus oryzae* Primary Endosymbiont) that enables the insects to live on the nutritionally extremely restricted diet of dry cereal seeds (Heddi *et al.* 2001). Since all *Sitophilus* species with pest status (but which feed on different cereals), have the same symbiont, the association must predate speciation, and also their agriculturally-assisted spread around the globe. This is yet another example of how important are the associations between insects and microbes.

So it seems clear we can now say with some certainty that there was no golden age free of insect pests. They existed even before agriculture. But did the invention of agriculture make insect pest problems even worse? That will be the topic of my next column.

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Entomologist-in-Residence

Professor Jim Hardie

– Director of Science –

The post of Entomologist-in-Residence, or more formally Director of Science, is a position that was set up in 2007. The post had been discussed for some years and it was felt that the Society needed a single entomologist who could act as the initial point of contact between the Society and any entomological enquiries. Dr Peter Barnard became the first Entomologist-in-Residence in 2007, just as the Society moved headquarters to The Mansion House and St Albans. Peter's role was full time, over three years, and his remit included being the interface for rapid response to enquiries from the public, press and other media together with writing the 'RES Book of British Insects'. The latter project has reached completion and is now in the shops in time for Christmas. Well done, indeed, Peter.

I succeeded Peter in June this year and as there is no book to write I shall be a part-time Director. I will retain some of the original remit and am now the first port of call for entomological queries and have taken on a Consulting Editor role with *Antenna* as we strive to develop this publication further.

I completed my BSc in Applied Biology, which included entomology and physiology, at Brunel University where the Head of Department was Professor JD Gillett, a one time President of RES. I then moved to Birmingham to complete a PhD on insect neuromuscular physiology using blow-fly larvae with Dr Mike Osborne and the Head of Department was Professor Laurie Finlayson, both well-respected insect physiologists. Following this, I moved to Imperial College at Silwood Park and worked with the Insect Physiology Group led by Professors John Kennedy FRS and Tony Lees FRS, both of whom served as RES Presidents. At this stage my entomological interests moved to the environmental and physiological control of polyphenism in aphids and later to aphid-plant interactions and chemical ecology. I have published over 170 articles, reviews and book chapters and edited a number of books.

In 1978 I became a Fellow of the Society and have served as President, Vice-President and Treasurer and two terms on Council. I have also been an editor of Physiological Entomology over the past 10 years. Thus I am well versed in the Society's business. Having now retired from Imperial College, I am very excited about this new position and see it as a fantastic opportunity for me to approach entomology from new perspectives. I have already touched on subjects from ants through bed bugs to *Zygaena*, explained to Isle of Wight radio why yellow school uniforms are intermittently popular with pollen beetles and chatted to researchers hoping to increase the entomological content of BBC's One Show – it is proving to be most educational.

Derek A. Lott

(1953 – 2011)

Coleopterist and Naturalist Extraordinaire

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British entomology and natural history lost a true champion on 19 June 2011 when Derek Lott, FRES succumbed to a lengthy illness at his home in Leicestershire, UK. I first met Derek when I was six or seven years old. I don't remember the exact occasion but his younger brother, Norman, and I were best friends and my older sister was in Derek's year at school. We all attended schools in Hampton, Middlesex and, with parental permission, Norman and I would often visit each other's houses to do whatever it is that six or seven year old friends do after school. It was during some of these visits that I met Derek and he, Norman and I would often re-enact test cricket matches in the garden or look for insects and other natural history curios in the neighbourhood.

Derek was a talented and conscientious student; he attended Hampton Grammar School and later graduated from Balliol College, Oxford with a B.A. in Chemistry in 1976. During part of this time, Derek grew his hair long, sang in a band and, as a 16-year-old, saw Jimmy Hendrix play at the Isle of Wight Festival, an achievement I have always envied.

During his Oxford days, Derek was courting his charming wife-to-be Beverley. This must have been an interesting relationship because Beverley was simultaneously studying languages at the University of Sussex. Nevertheless, university holidays are long, the relationship flourished, and they married in 1977. They have two grown children, Anne and John, who are both now married and Anne and her husband Asress had a baby, George, about a year before Derek's untimely passing. Happily, Derek was able to enjoy grandfatherhood for several months. Derek always put family first and cherished his time with relatives and friends.

Following graduation from Oxford and obtaining a Post-Graduate Certificate in Education from the University of Warwick in 1977, Derek became a Science Teacher at Crown Hills School, Leicester. As much as Derek enjoyed teaching, his interests gradually started moving (or reverting) towards nature conservation, biological recording, museum studies and entomology, especially beetles. Although this started as a hobby, he worked with the Leicestershire Museums Service as a Graduate Trainee in 1983 and, in 1985, after obtaining a Post-graduate Certificate in Museum Studies from the University of Leicester, he switched professions and became Assistant Keeper of Entomology at Leicester Museum. Derek amassed huge numbers of biological records for the museum, and for other museums and conservation or research organizations as well. The Derek Lott Coleoptera dataset (now part of the National Biodiversity Network database) includes 61,366 records of British and Irish beetles identified by Derek. Gradually, Derek's interest in beetles became more focused into the speciose family Staphylinidae (rove beetles), a group that desperately needed taxonomic attention and identification guides for the British fauna. Derek was the man to take on this immense task and he authored a significant number of papers on the British Staphylinidae including two recent (2009 and 2011) Field Studies Council/RES Handbooks for the Identification of British Insects.

Derek's family was very supportive of his research. His father, John, expertly made him glass-topped insect drawers with accompanying cabinets; his brother, Norman, would sometimes bring back beetles from exotic locales he had visited, and Beverley and his parents, John and Georgina, all "tolerated" (to an extent) mounds of organic matter on the dining room table as Derek sorted through it for beetles. Related to this activity, one memory I have of Derek concerns an entomological field trip he and I made to Windsor Great Park the day after his brother Norman's stag night. Despite being tired from the previous night's activities, Derek rapidly located some fresh horse dung along a trail in the park and swiftly hoisted it onto a plastic sheet and began aspirating small beetles from it with his always-at-hand pooter. After a few minutes, a well-groomed young lady riding a well-groomed horse appeared on the trail. She stopped to decipher what Derek was doing, before exclaiming a loud "eyoow" and riding off into the distance. Derek was so engrossed in the beetles, that I'm not sure he even noticed she had been there.

Although Derek's publications mainly address the British fauna, he was also interested in faunas from other regions. In 2001, he and Beverley visited my wife and me in Georgia (USA) and they also spent a week on St. Catherines Island just off the Georgia coast. During that week Derek

must have been collecting beetles almost continuously because he ultimately produced a huge list of staphylinids for the island including several undescribed taxa. Unfortunately, Derek did not have time to describe those taxa but the beetle list he provided was greatly appreciated by the island manager and other entomologists on this side of the Atlantic. Derek also showed that alligator presence had a significant effect on wetland beetle faunas on the island. Alligators and Georgia apparently made an impression on Derek because he later proposed that the Balfour-Browne Club convene for a meeting (including field work) in southern Georgia (all previous meetings had been held in Europe); this was apparently well received until the alligators were mentioned, at which point the proposal was quietly declined by the membership. I would collect staphylinids for Derek from various parts of the world and he would reciprocally, forward fleas, lice or ticks for my studies. Perhaps the saddest message I received from Derek was in May 2011 after I had told him I had collected some unusual staphylinids in French Guiana. He responded by stating that he would not have time to work on them because he had been given one to two more months to live but that he would be happy to forward them to the NHM. In addition to fieldwork in England and the USA, Derek completed field studies across much of Europe (especially Ireland and France) and in Africa.

As Derek's widespread expertise of the British insect fauna and recognition increased, he ascended through the ranks at the Leicestershire Museums Service, being promoted to Keeper of Biology in 1994, Keeper of Natural Sciences in 1997 and Curator of Natural Life in 1999. The latter promotion was also related to the Ph.D. he earned in 1999 from the University of Newcastle on the ecology of semi-Aquatic floodplain beetles under the direction of Dr Martin Luff after Derek had worked on his Ph.D. research for several years on a part-time basis. He was also appointed as the first Director of the county Records Centre when it became a separate entity under the auspices of the Leicestershire County Council's planning department. During his time with Leicestershire Museums Service and following early "retirement" in 2004, he was involved in many environmental assessment projects in Leicestershire and further afield. Upon his retirement from Leicestershire Museum Services, he became a consultant entomologist and set up the business name *Stenus Research* with an appropriate logo (*Stenus* being one of his favourite genera of staphylinid beetles). Although Derek was a coleopterist at heart, he could also identify other British invertebrates and was, for example, particularly adept at dragonfly determinations. Such abilities made Derek a much sought-after consultant for assessing key habitats and making recommendations for biological site management for organizations such as English Nature, The National Trust and The Forestry Commission. In 2010 Derek was made an honorary member of the National Biodiversity Network Trust in recognition of his outstanding contributions to the world of biological recording.

Derek also contributed in other ways to his chosen profession. He served on the editorial panel of *The Coleopterist*, was a long-term chairman of the Leicestershire and Rutland Wildlife Trust, a Trustee of the Aquatic Coleoptera Trust and represented the Balfour-Browne club by coordinating water beetle records and preparing guidelines for assessing invertebrate habitats.

Derek was a relaxed, friendly, accepting and always approachable individual with a wry sense of humour. Some of these attributes, in addition to his masterful writing style, are evident in the pages of his historical account of *The Leicestershire Coleopterists: 200 Years of Beetle Hunting* which was published as a booklet, replete with colour images, by the Loughborough Naturalists' Club in 2009. Derek now joins the ranks of such historical luminary Leicestershire coleopterists as Henry Walter Bates, Frank Bouskell, Horace Donisthorpe, Donald Tozer and Claude Henderson. He is survived by his wife Beverley, his parents John and Georgina, his brother Norman, his son John and his wife Jacqui, his daughter Anne her husband Asress and their son George, and by many other relatives and close friends. Derek Lott will be greatly missed but he lives on in our hearts, inspiring us to new heights.

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The holotype of *Speccafrons genavensis* Merz, 2010 (Diptera: Chloropidae), a species discovered in Geneva canton.

The entomology collections of the Geneva Natural History Museum

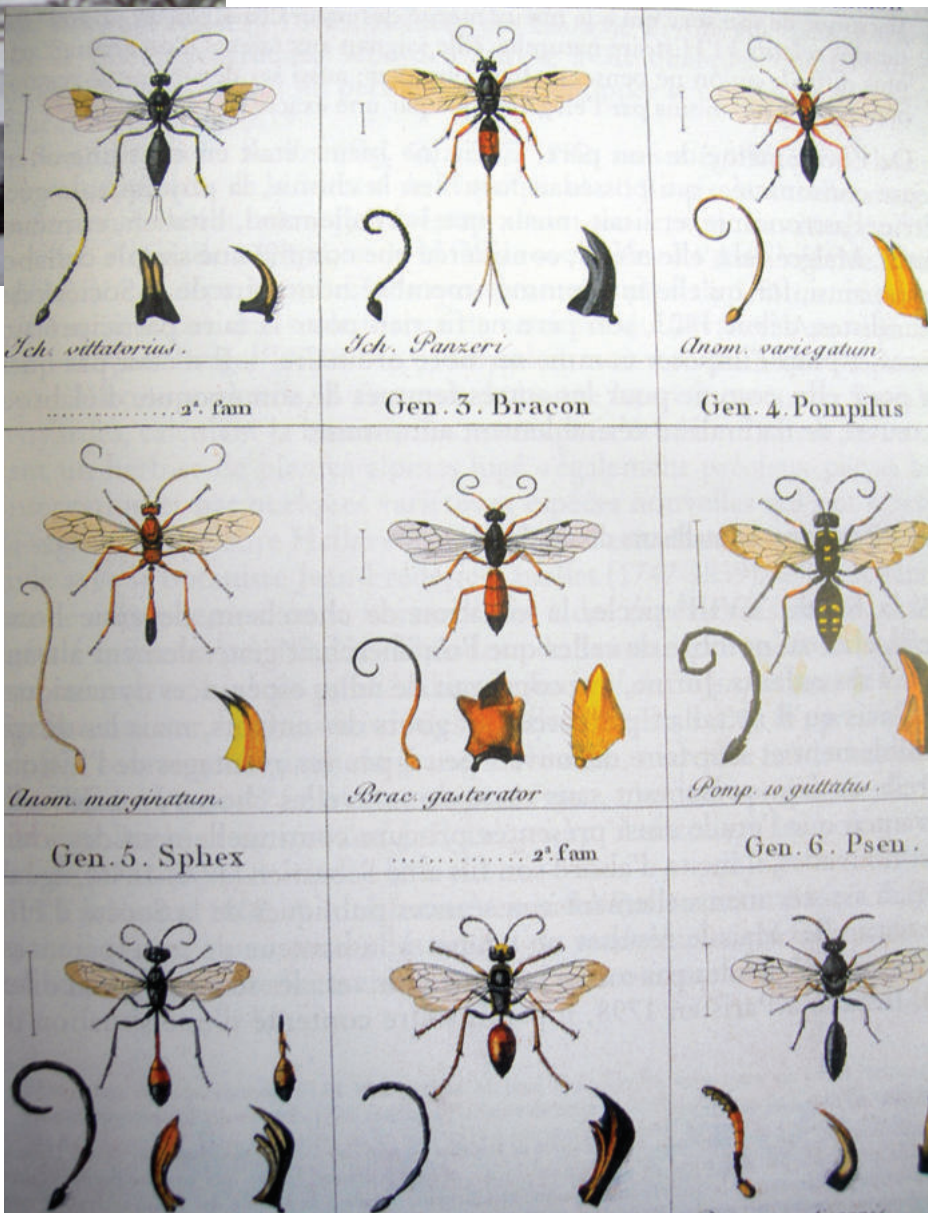
Bernhard Merz,
John Hollier,
Peter Schwendinger

The Natural History Museum of Geneva is housed in purpose built premises that opened to the public in 1966, the exhibition space and scientific building standing in a small park. In a reorganisation associated with the move to the new buildings, the department of Arthropods was divided into two more or less equal parts, with the Department of Arthropods and Entomology 1 (ARTO) holding the minor insect orders and non-insect collections, and the Department of Entomology 2 (ENTO) managing the collections of the four mega-diverse orders Coleoptera, Diptera, Hymenoptera and Lepidoptera.

The origins of the museum collections date back to the 18th century, with the constitution of a "curiosities room" in the city library in 1725. The idea of creating a natural history collection was suggested by several of the enlightenment thinkers in Geneva, but the tumults of the French revolution and subsequent invasion meant that their projects foundered and it was not until 1820 that the Musée Académique was formally created. The Natural History Museum became a separate entity in 1872, largely due to the efforts of François-Jules Pictet de la Rive (1809-1872) who was Professor of Zoology and Comparative Anatomy at the Geneva Academy (forerunner of the University) for many years.

Two Genevan scientists made early contributions to entomology. Charles Bonnet (1720-1793) is best remembered for discovering parthenogenesis in aphids, and published many observations of invertebrates (he used the term "insect" rather indiscriminately, and it is often impossible to tell which taxa he was referring to). Despite his wide correspondence, Bonnet's collection did not include many exotic specimens, and little trace of it remains. A more important contribution was that of Louis Jurine (1749-1819), who, amongst other discoveries (including echo-location in bats), was one of the first entomologists to use the wing venation of Hymenoptera in the classification of the group. Some of Jurine's insect specimens are preserved in the Museum collections in their original boxes, but those which he used for his pioneering studies of aquatic Crustacea are apparently lost.

Left: Louis Jurine, engraving by Louis-Ami Arlaud



Right: One of the plates from Jurine's 1807 publication on the Hymenoptera.

The holotype of *Corycoides jurinei* (Saussure, 1862) (Orthoptera: Tettigoniidae), a specimen from Jurine's collection.

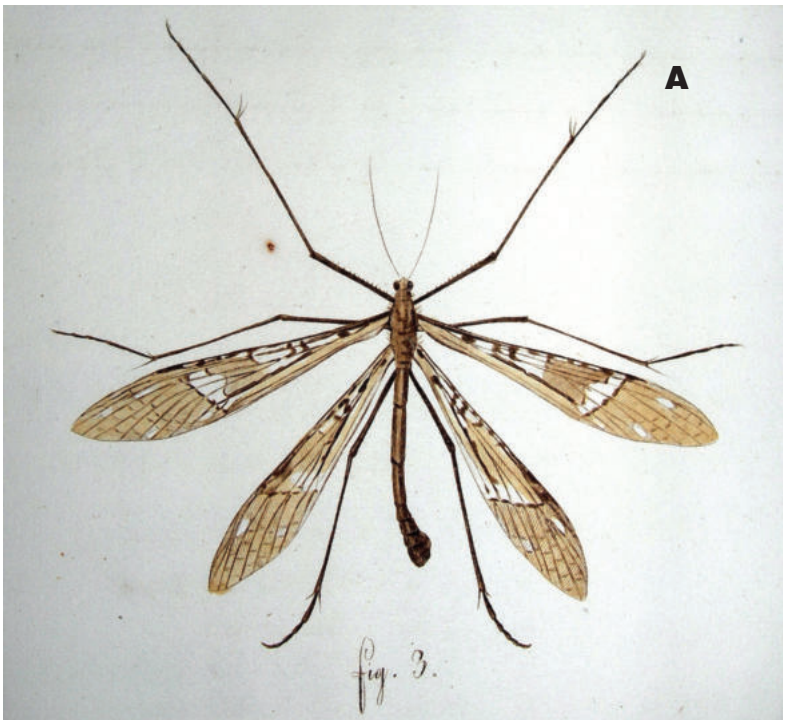
François-Jules Pictet de la Rive was energetic in enlarging the natural history collections of the Museum. His own entomological work was on Neuroptera (*sensu lato*) and he produced, amongst other works, influential monographs on the Trichoptera (1834), Plecoptera (1841) and Ephemeroptera (1843-45). The manuscript and illustrations for the fourth, unpublished volume on the Neuroptera is preserved in the Museum. Pictet also oversaw the acquisition of collections large and small, and as a teacher inspired his pupils to study entomology. Two of F.-J. Pictet's sons also enriched the Museum; Edouard Pictet (1853-1879) published a monograph on the Neuroptera (*sensu lato*) of Spain following an expedition to that country with Rudolf Meyer-Dür (1812-1885), while Alphonse Pictet (1838-1903) studied Orthoptera, mainly in collaboration with Henri de Saussure.

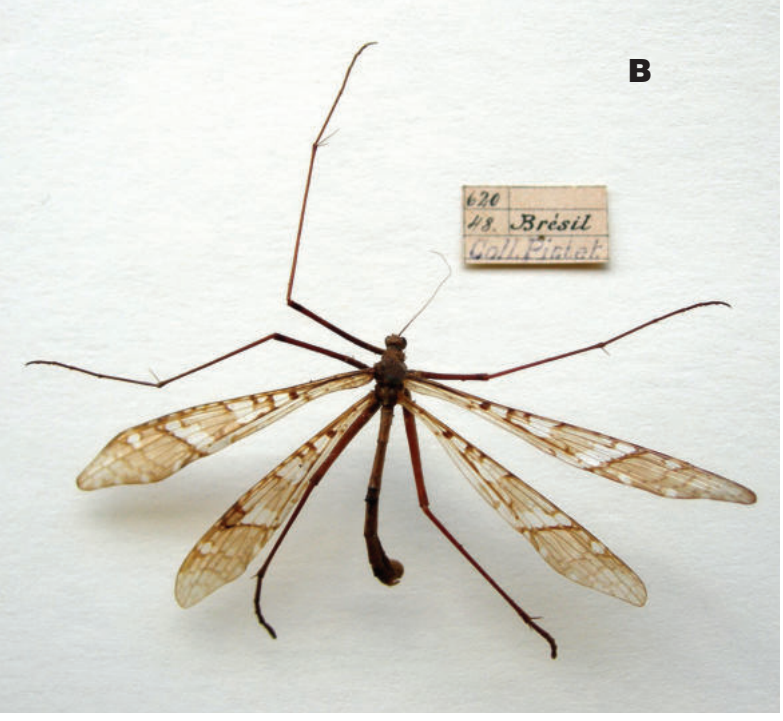
Saussure (1829-1905) played an important role in the development of the collections, serving on the governing board of the Museum for some 40 years. His publications, which span more than 50 years, were mainly about the Orthoptera (*sensu lato*) and Hymenoptera, as well as contributions to Myriapoda and Crustacea and sundry other topics. Over the course of his career Saussure developed an international network of contacts, loaning and borrowing material for study and exchanging or buying specimens or collections. Thus the Geneva Museum has many type specimens of species described by famous entomologists such as Josef Redtenbacher (1856-1926) and Carl Brunner von Wattenwyl (1823-1914). Saussure, having made an expedition to Mexico and the Antilles in 1854-56, was particularly interested in the Americas, making the Museum an important point of call for American entomologists.

The Coleoptera collections were augmented in 1861 when 370 insect boxes containing André Melly's collection, one of the largest private collections at that time, were given to the Geneva Museum. André Melly (1802-1851) was born in Geneva, but he moved to Liverpool, married the daughter of his business partner and became a British citizen. His business interests were mainly in Egypt and he died in the Nubian Desert, according to some accounts after trying to find the source of the Nile.

The first curator for the natural history collections was Aloïs Humbert (1829-1887), a former student of F.-J. Pictet, who was appointed in 1854. Humbert led an expedition to Sri Lanka (taking in Lebanon on the way back to collect fossils for F.-J. Pictet) and published a number of papers on Myriapoda and Diplura. The first curator of Arthropods in the Natural History Museum was Emil Frey-Gessner (1826-1917), who published on Hemiptera and Orthoptera but is best known for his work on the Swiss Aculeate Hymenoptera. He was assisted and then succeeded by Jean Carl (1877-1944) who went on to become Assistant Director of the Museum. Carl's most important work was on Myriapoda and Orthoptera, but he was also a pioneer in the study of the alpine Collembola.

General view of the Collembola collection.





a) the illustration accompanying the description of *Neobitacus blancheti* (Pictet, 1836) (Mecoptera), b) the type specimen.

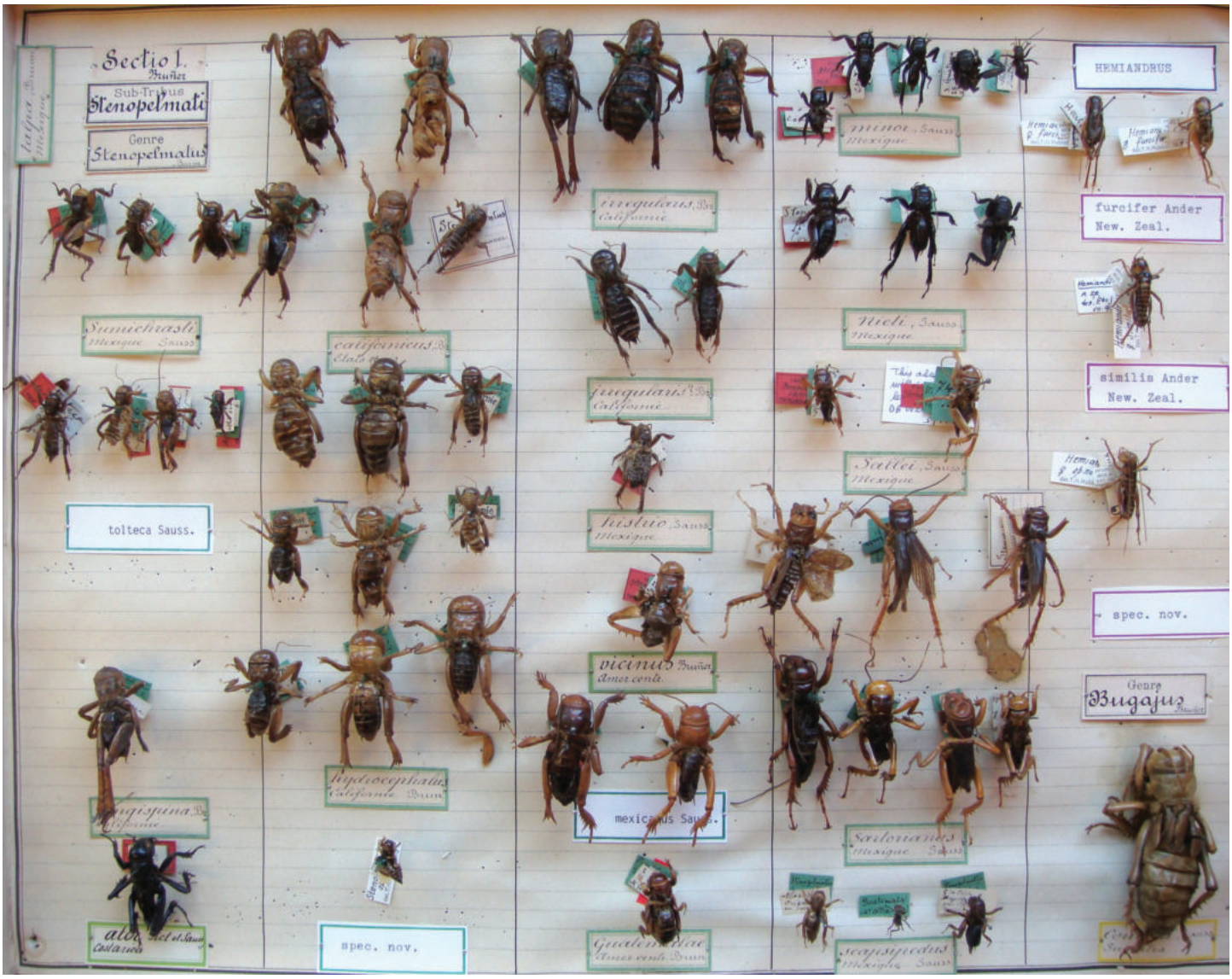
Research on the latter group blossomed under his successor as curator, Herman Gisin (1917-1967), who produced the first monograph on the European Collembola fauna (1960). As a result of Gisin's research and the acquisition by the Museum of the private collection of the Japanese Collembola expert Ryozo Yoshii (1914-1999) the holdings of the Geneva Museum are of major importance for this group. Unlike most of the entomology collections, these and the other small soil arthropods are principally stored in alcohol or on microscopic slides.

One of the treasures of the Museum is the ant collection of Auguste Forel (1848-1931). Forel was a psychiatrist, neuroanatomist and writer on social issues, as well as a myrmecologist. His collection is world-wide in scope, with over 5,000 type specimens. The Hymenoptera collection of Henri Tournier (1834-1904) also adds value to the Museum holdings.

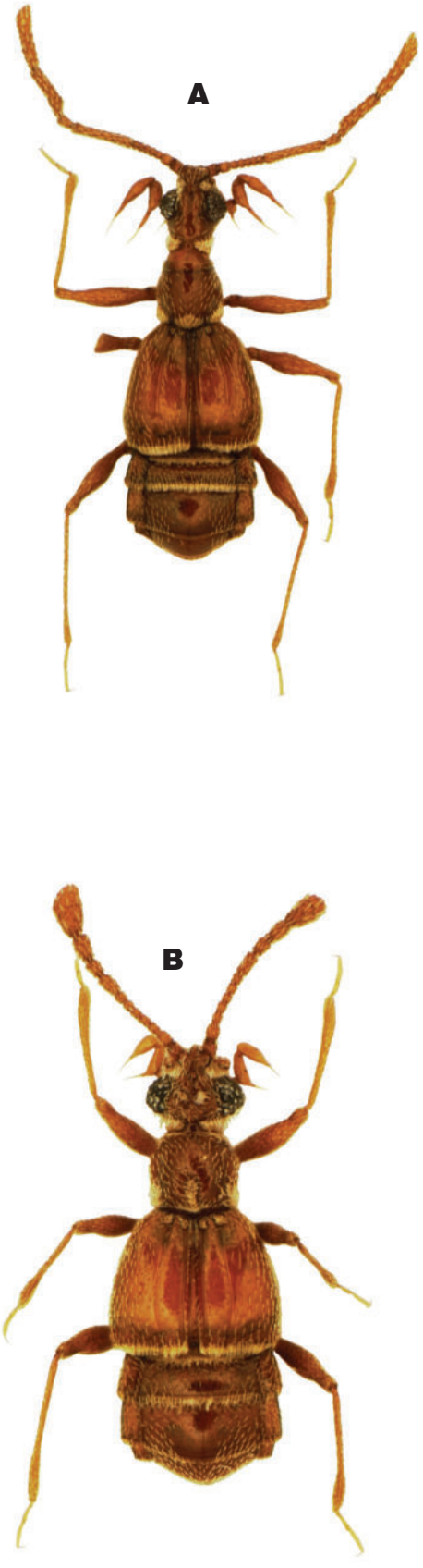
The first curator appointed for the insect collections in 1944 was Charles Ferrière (1888-1979), a specialist of parasitic Hymenoptera. He was succeeded by Claude Besuchet, a coleopterist specialising in Pselaphinae. It was Besuchet who oversaw the installation of the collections in the new Museum's scientific building.

After the premature death of Herman Gisin, Bernd Hauser became curator of ARTO and maintained the research focus on endogean and cave dwelling arthropod faunas. As a result Bruno Condé (1920-2004) and Jean Pagès (1925-2009) worked extensively with the Museum material, enriching the collection of Diplura (as well as certain non-insect groups), and Josef Nosek (1924-1984) studied the Protura while producing his monograph on the European fauna (1973).

The acquisition of the Orthoptera collection of Kurt Harz (1915-1996) and donation of that of Adolf Nadig (1910-2003) added to the importance of these holdings, and the Museum is known for the richness of its collection of orthopteroid insects. The acquisition of the Palaearctic Heteroptera collection of Hans Eckerlein (1912-1977), and the Siphonaptera of Fritz Peus (1904-1978) mean that the Museum is now an important centre for these groups as well.



Insect box from the Orthoptera collection, rich in types.



The holotypes of a) *Ctenisomorphus fortipalpis* Besuchet & Cuccodoro, 1211 and b) *Enoptostomus arabicus* Besuchet & Cuccodoro, 2011 (Coleoptera: Pselaphinae) from the UAE.

Daniel Burckhardt, while working in ENTO, built up the Psylloidea and Coleorrhyncha collections and continues to add to them while they are on loan in the Basle Natural History Museum.

The value of the Psocoptera holdings is mainly due to the industry of Charles Lienhard, who continues to enrich it in retirement. Its importance is enhanced by the presence of the private collection of André Badonnel (1898-1991).

The current research interests of ARTO are focused on Arachnids.

Under the guidance of Claude Besuchet as curator of ENTO, his successor as curator Ivan Löbl (assisted by Daniel Burckhardt), and latterly Giulio Cuccodoro, the Coleoptera collection, with a strong worldwide focus on the humicole fauna, has grown steadily and increased in importance. The acquisition of the personal collections of Gustav Lohse (1910-1994) and Rudolf Petrovitz (1906-1974) introduced a large number of additional type specimens. The latest acquisition is the collection of Harald Schweiger (1927-2009). The Coleoptera holdings now stand at more than 50,000 species and over 2 million specimens; the Staphylindae, especially the Pselaphinae are particularly important. The holdings of specialist cave dwelling species are also very rich.

Bernhard Merz has developed the Diptera holdings, particularly the Tephritidae and Lauxaniidae, to make the Museum an important centre. The most important Lepidoptera collection acquired (with some 160,000 specimens) is that of Jacques Plante (1920-2003), particularly rich in Noctuidae. The Lepidoptera holdings comprise some 500,000 specimens and 350 primary types, and the collection is in the final stages of being consolidated. Bernard Landry is researching some groups of South American micro-Lepidoptera with an emphasis on Pyraloidea, and the collection houses some 1600 identified species of this group, from all continents.

Historically, Geneva has always been regarded as anglophile, and Napoleon is said to have remarked that the Genevans spoke English too well to be trustworthy. The entomologists of the Museum hope that researchers from the anglosphere wishing to study the departments' holdings will regard this stigma in a more positive light.

Acknowledgements

We are grateful to Claude Besuchet and Bernd Hauser for many fascinating discussions of the history of the Museum and its collections, and Bernard Landry, Giulio Cuccodoro and Anita Hollier for comments on the text.

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Asian Gallwasp Project: Taiwan-China Expedition 2011

ARTICLE

Left to right - Chiang-Ti Tang, Jack Hearn, Frazer Sinclair and Konrad Lohse

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Introduction

The Cynipini gallwasps are a fascinating tribe of insects whose larvae induce complex and often spectacular galls on trees of the Fagaceae family. These galls support rich multi-trophic communities and are a valuable ecological model system. The majority of the ~1000 known Cynipini species are associated with trees of the genus *Quercus* in North America and Europe, but it is becoming increasingly apparent that there is further undescribed diversity associated with other Fagaceae genera, particularly those endemic to Eastern and Central Asia. The inclusion of these yet undiscovered species in a phylogenetic analysis could shed new light on the geographic origin of the tribe, and reveal the evolutionary processes that govern the association between gallwasps and their host plants. The 'Asian Gallwasp Project' was established in 2009 by postgraduate students at the University of Edinburgh to promote study of the ecology and taxonomy of Asian gallwasps and their associated communities. The first project expedition took place during spring 2011 in Taiwan and southern China, and involved researchers from the University of Edinburgh (UK), the National Chung-Hsing University (Taiwan), and the Xishuangbanna Tropical Botanic Gardens (China). The aims were to assess gallwasp diversity on Asian endemic oaks and to collect specimens for species descriptions and phylogenetic analysis. In this article, we describe the expedition and its findings, and discuss our plans for future work.

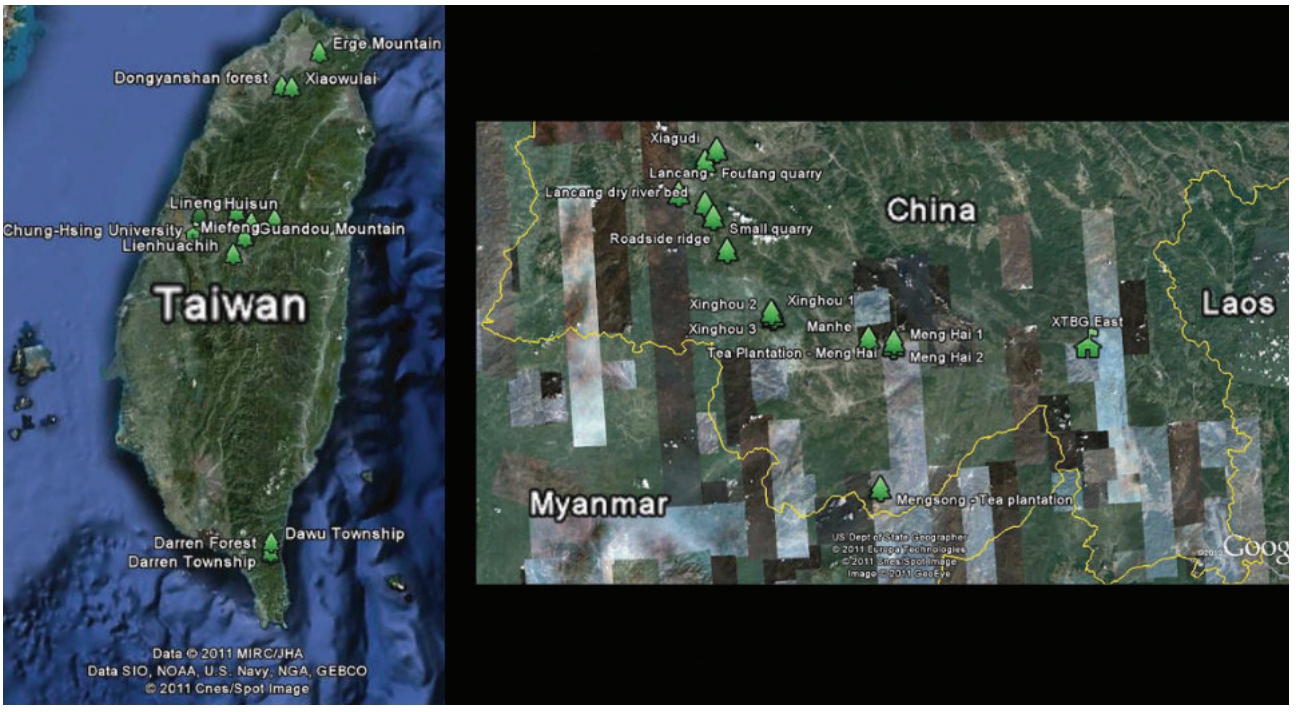

Figure 1. Google Earth images of collection sites in Taiwan, left, and Southern China, right.

Figure 2. Novel 'fluffy pink leaf gall' on *Quercus sessilifolia*, Taiwan photograph by Chang-Ti Tang)

Taiwan: March 13th – 31st, 2011

The Edinburgh members of the expedition arrived in Taichung and were taken for an excellent welcome dinner with their host, Professor Man-Miao Yang from the National Chung Hsing University (NCHU). After a day to acclimatise, we embarked on an intensive fieldwork programme that covered thirteen sites between elevations of 400 and 2200 meters (see Figure 1). Invaluable assistance in the field was provided by students from Professor Yang's research group including Shun-Wei Hou, Sheng-Feng Lin, I-Chang Liao, and Wesley Hunting. A total of 76 different gall-types were collected, 48 of which had never previously been recorded. Notable findings included 3 new gall-types from *Castanopsis uraiana* at Xiaowulai that were discovered by climbing into the tree canopy using rope access methods, and hundreds of a previously unknown 'fluffy pink leaf gall' found on *Quercus sessilifolia* at Erge Mountain (Figure 2). The expedition was timed to coincide with the maturation of sexual generation galls, and back in the labs at NCHU the collected galls quickly yielded an abundance of gallwasps (Figure 3), inquilines, and parasitoids. Between fieldwork, time was found to visit Sun-Moon Lake and the 921 Earthquake Museum, and to sample the delights of 'stinky tofu' at the Zhongxiao night market.

Xishuangbanna, China: April 1st – 16th

After three flights and a night in Hong Kong, we arrived at the Xishuangbanna Tropical Botanic Gardens (XTBG) where we were hosted by Professor Charles Cannon. During the two week visit, galls were collected within the grounds of XTBG and at several sites within Xishuangbanna and neighbouring Lan Cang County, between 500 and 1700 meters elevation (Figure 1). Valuable field assistance and botanical expertise were provided by XTBG staff including Jing-Xin Liu and Jian-Wu Li. A total of 41 gall different gall-types were collected, 37 of which had never been recorded before. Galls were reared in Professor Cannon's laboratory at XTBG with much appreciated assistance from PhD student Warin Harrison. Notable findings included 3 novel gall-types from a single tree of *Castanopsis echinocarpa* at Foufang quarry (Figure 4), all of which produced adult gallwasps within days of collection. Also at this site, there was the unique opportunity to examine a species of the rare Fagaceae genus *Trigobalanus*, although no evidence of gallwasps could be found. To celebrate the end of a successful expedition, we received a thorough soaking at the Dai new-year water splashing festival in Menglun.

Preliminary analysis and results

Cynipini galls were sampled from tree species in each of the genera *Castanopsis*, *Lithocarpus*, and *Quercus*, in both Taiwan and China (Table 1). The majority of collected gall-types were novel (85/115), and their discovery represents a substantial addition to knowledge of Asian Cynipini. Analysis of the number of gall-types per individual tree species indicated that there was no significant difference in gall diversity between the three genera (ANOVA, p=0.753). This is somewhat surprising, as almost all currently described Cynipini species are associated with trees of the genus *Quercus*. Approximately 450 species of *Quercus* are known globally, which is comparable to the combined number of *Castanopsis* and *Lithocarpus* species (~120 and 300 respectively). If the true diversity of gallwasps per tree species is even remotely similar across these taxa, as these findings suggest, then Asia is likely to be home to hundreds more undescribed gallwasp species representing a considerable proportion of the tribe.

Figure 3. Female gallwasp on young leaves, Taiwan (photograph by Jack Hearn)

Figure 4. One of the three novel gall-type on *Castanopsis echinocarpa*, China (photograph by Chang-Ti Tang)

Country	Tree Genus	No. Gall-types	No. Tree species	Mean No. gall-types per tree species	No. Gall-types that produced adult gallwasps
Taiwan	*Quercus*	40	12	3.33	17
	Castanopsis	20	6	3.33	2
	Lithocarpus	15	7	2.14	0
China	*Quercus*	12	8	1.50	2
	Castanopsis	20	7	2.86	4
	Lithocarpus	10	3	3.33	0
Taiwan + China	*Quercus*	51	19	2.68	19
	Castanopsis	39	12	3.25	6
	Lithocarpus	25	11	2.27	0

Table 1. Summary of gall-types and host tree species recorded in Taiwan and China.

The monitoring of collected galls is ongoing, and adult gallwasps have so far been obtained from 25 different gall-types (Table 1). Particularly notable are the 6 types from galls on *Castanopsis* (e.g. Figure 5), which more than doubles the number of species currently recognised from this tree taxon. Unfortunately no adult gallwasps have yet been obtained from *Lithocarpus* galls, despite 25 different gall-types having been collected. This may reflect particularly high rates of colonisation by inquilines or parasitoids that cause the death of the gall-former. Alternatively, it was noted that several gall-types had fresh exit holes, and it is possible that the collections were conducted too late in the season for galls from these trees.

Further work

Gall rearing continues at NCHU and XTBG and it is expected that the majority of adult wasps will have soon emerged. Specimens shall be transferred to the University of Edinburgh, where their DNA will be sequenced and combined with existing data to generate a phylogeny of the Cynipini tribe. This shall be used to assess; (1) what is the likely geographic origin of the Cynipini tribe? And (2), what are the relative roles of parallel cladogenesis (i.e. diversification in unison with host-plant) and host-shifting (i.e. switching between distinct host-plant taxa) in the evolution of the Cynipini? Following analysis of DNA sequence data, morphological analysis shall be conducted in collaboration with Dr George Melika, a world renowned expert in Cynipid taxonomy. Formal descriptions of novel species will be published in taxonomic journals, and type specimens shall be deposited in the collections of appropriate institutions in Taiwan and China.

It is evident from the findings of this expedition that a considerable proportion of the Cynipini tribe has yet to be discovered within Asia. With the collected specimens we can begin to place Asian Cynipini within the phylogeny of the group, but more comprehensive sampling is required, particularly for those species associated with *Lithocarpus*. As our collection of specimens grows so can the scope of our investigations, with the potential for further studies of the phylogeography of Cynipini in Asia, and the phylogenies of gall associated inquilines and parasitoids. It is expected that this was just the first of many successful Asian Gallwasp Project expeditions.

Acknowledgements

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We are also most grateful to Professor Man-Miao Yang and Professor Charles Cannon for hosting the expedition, and for the assistance of staff and students at NCHU and XTBG, particularly Miss Yi-Chuan Li and Mr Song Yu.

Figure 5. Novel gall-type on *Castanopsis* spp, China (photograph by Chang-Ti Tang)

Our President has asked for a 'general interest' article about Pacific research which the Society has (with others) generously funded in recent years – and of course I am delighted to share some of my experiences.

Scientific fieldwork or self-indulgent adventure ... or both?

"It is not down in any map; true places never are"
Herman Melville

Munuwata Island in the Trobriands.

W. John Tennent

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John Tennent, a Fellow of the Society for almost 30 years and a Fellow of the Linnean Society (he was awarded the Society's H.H. Bloomer medal in 2007), retired from government service in 1991. Since then, he has published more than 200 papers and three books on Lepidoptera and the history of natural history, concentrating most recently on Pacific butterfly biogeography and systematics. He is a Scientific Associate at the Natural History Museum, London, and has travelled very extensively, spending long periods in the field, usually in remote parts of the world difficult to reach.

One might think the world is now so overcrowded with *Homo sapiens* that there are few if any wild places left to explore. The truth is there are plenty of them, although getting 'off the beaten track' nowadays does require some initiative in planning, and almost unlimited time. I have understood since being a teenager with a low boredom threshold and itchy feet that I was born at least 100 years too late – real Pacific Adventure was to be had by A R Wallace, A S Meek, the Pratt and Eichhorn brothers and others who reached places no outsider had ever been, often under impossible conditions. Of course, these travellers and natural history collectors and adventurers are the ones who survived – what other names might have been equally familiar if they hadn't succumbed to disease far from any medical help, or – in the Pacific anyway – been eaten by folk who saw them as a convenient source of protein.

In searching the literature and examining museum collections around the world in preparation for a butterfly checklist of the thousands of remote islands in the southwest Pacific (Micronesia, Polynesia, Melanesia), it became clear that the chains of islands off the eastern coast of the main island of New Guinea (Milne Bay Province) were largely unexplored. Not just poorly explored, or visited occasionally, but in many cases unvisited. It was equally clear from available maps that many of the islands are substantial and judging from the known faunae of nearby islands which had been visited (often 100 years or more previously), the probability of new records and

A snorkelling paradise of clear water belies the danger of barely submerged coral heads in approaching Rossel Island at the eastern extremity of the Louisiade chain.

Early morning mist at Kaduaga village on Kaileuna Island in the Trobriands.

undescribed taxa was high. In a travel context, 'unexplored' is probably now synonymous with 'hard to get to', or, – and this isn't the same thing – 'hard to return from', but nothing is impossible.

Obtaining a research visa for Papua New Guinea took the best part of three years; an intensely frustrating process but once a visa was granted, I was able to spend almost nine months there in 2010. Papua New Guinea enjoys a rather fearsome reputation; care must be exercised by locals and visitors alike in the capital, Port Moresby, where to venture outside the gates of the hotel even in daylight is to invite the sort of adventure we can all live without. Other parts of Papua New Guinea (e.g. the Highlands) have their own difficulties but my research was almost wholly carried out on the islands of Milne Bay Province, off the eastern extremity of the main island. This was fortuitous. The provincial capital, Alotau, lies at the throat of Milne Bay which, together with a passage through the many islands and treacherous channels of the western Louisiades, was surveyed by Captain John Moresby on *H.M.S. Basilisk* in 1873. Alotau is a small, friendly town. Milne Bay people are pragmatic and forgiving, and local gripes rarely become publicly belligerent as they do elsewhere in the country.

The main islands of Milne Bay Province include the Trobriand, D'Entrecasteaux, and Louisiade groups – the last two are a structural extension of the rugged Owen Stanley Range on the main island of New Guinea – all of which have been visited occasionally by a series of naturalist/explorers, mostly more than a century ago. Such visits have generally been confined to the largest islands and some notable small ones. For example, Samarai, a small island in the western Louisiades, was the country's capital prior to Port Moresby, and a regional trade centre for many years. The lowland fauna of the three large islands of the D'Entrecasteaux (Goodenough, Fergusson and Normanby) group, with several peaks over 2,000m elevation, is moderately well known, at least so far as butterflies are concerned – but only moderately – in less than a week on Normanby in 2010 the number of butterfly species recorded from the island was raised from 128 to 151 without any great effort. There are records from Kiriwina, the main island of the Trobriands, from the large island of Woodlark to the east, and from some of the larger islands of the eastern Louisiades (Misima, Sudest and Rossel). But most smaller and more remote islands are completely unknown, and whilst some are little more than a rock with a tree, islands that look insignificant on the map (some don't appear on any map) are often substantial, high and clothed in luxuriant vegetation. For example, on two visits to Gawa, the most southerly island of the Marshall Bennett group, which lies between the Trobriands and Woodlark, 44 butterfly species were recorded in 2010, compared with only 106 known from the very much larger island of Woodlark just a few kilometres to the east. Previous records from Gawa number only four species, and the butterfly fauna now known from the island has some unexpected dissimilarities with those of Woodlark.

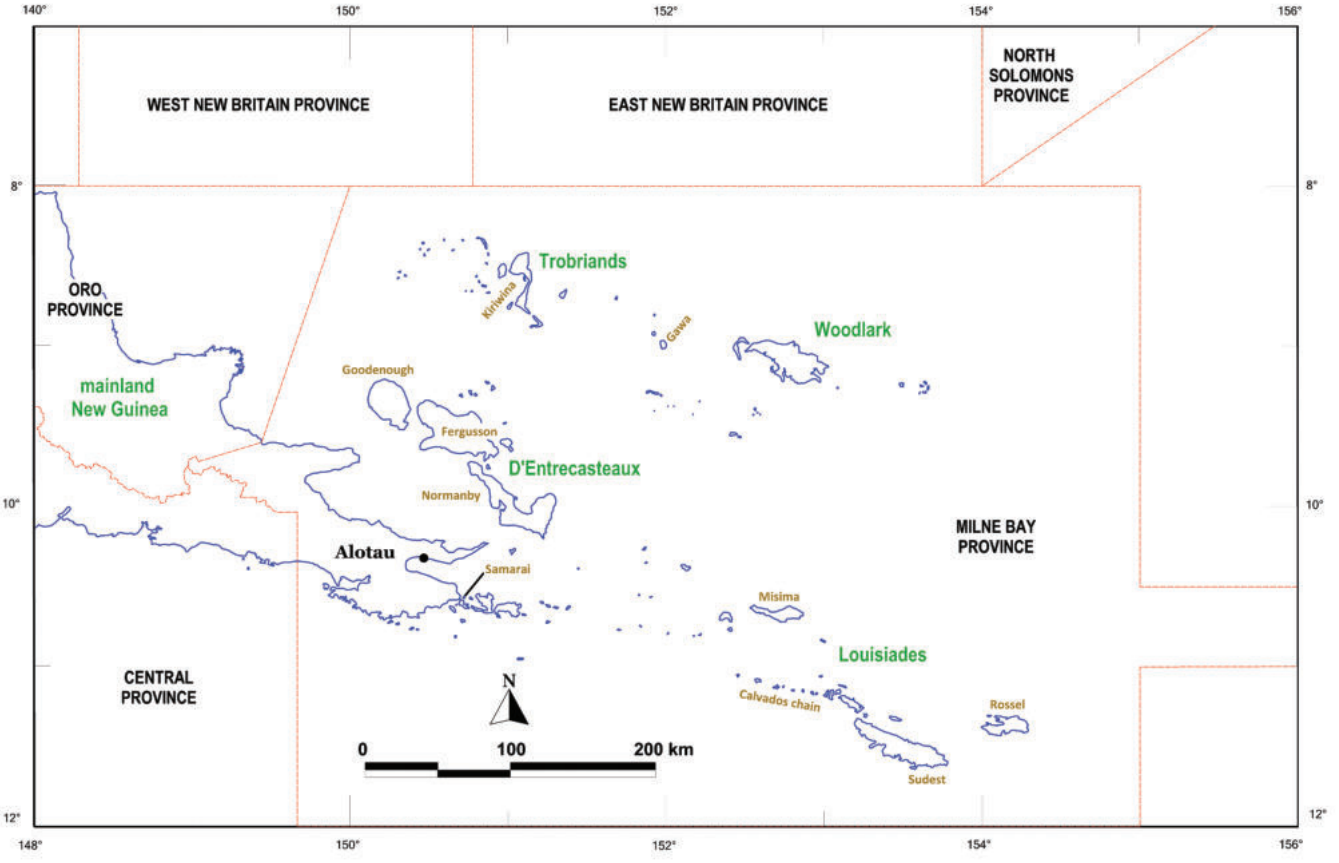
The way of life of people on outer islands varies and is dependent on the topography of the island and whether they live on the coast or inland. Traditional accommodation is always simple; in some villages there are what are called "permanent" buildings built from materials – wooden planks or corrugated iron or a combination of both – not immediately available locally but most consist of uneven floors and walls constructed from bamboo or thin poles and covered with a kind of shallow "thatch" roof made from a variety of palm leaves, with a combined life of 2-10 years depending on local conditions and how well they are built. No village has accommodation for visitors, but islanders are naturally hospitable and a flat, covered space raised off the ground is almost always available somewhere. All buildings are raised on 'stilts' to avoid flooding in a tropical downpour,

allow air circulation and provide storage space underneath the house for canoes and other valuable possessions. This also serves to stop animals (e.g. pigs) entering a house and helps – though not much – to reduce the number of rats scurrying everywhere at night. Although many older people have at some time in their lives travelled to Alotau or further afield, and there remains a significant mobile missionary presence in the country, a sizeable section of the population on some remote islands have never seen a white person. Small crowds of children appear from nowhere and sit silently for hours watching the visitor's every move, whispering between themselves when something exciting and magical appears in front of their very eyes (a butterfly net emerging from a folded metal frame is a favourite) but ready to run for their lives if an unexpected move is made in their direction. This is fine, except that washing facilities consist of throwing bowls of rainwater over oneself whilst hiding, usually with only limited success, behind someone's hut – a process perceived by curious children to be very interesting indeed.

Some Milne Bay island names are well known in the wider world. For example, the Trobriands were made famous by Polish anthropologist Bronislaw Malinowski, whose account of "loose" sexual practices, especially during the yam harvest, in his book *The Sexual Life of Savages in North-Western Melanesia* published in 1929 resulted in a large trickle of visits to Kiriwina from optimistic middle-aged male tourists, all of whom left with unfulfilled expectations. Tradition has it that leading questions resulted in Malinowski being told what he clearly wanted to believe; having been in the Trobriands at the time of the yam harvest, I can report that – perhaps disappointingly – I escaped unscathed! Other islands are literally unknown. At the other end of the scale, the Louisiade island of Manugam didn't exist at all until *ca* 20 years ago. It arose from drifting sand in just a few years and is now covered with vegetation providing a relatively safe nesting ground for terns and turtles – plenty of spiders (and no, please don't ask me to catch you any – the blessed things terrify me), but no butterflies yet, probably due to a present lack of suitable host-plants.

Travel between islands is at the mercy of the elements and most local people travel using self-built sailing canoes. There are domestic airline services to Kiriwina and to Misima in the Louisiades, and a charter service run by Woodlark Mining Company to Woodlark but no other islands are reachable by any air service. Few of the remaining 2,000 or so islands in Milne Bay Province have any area flat enough to take a small plane, even if there was the need for one, and most are outside the range of a helicopter even in an emergency. Although one or two islands have privately owned short wave radio which may or not work – usually the latter, communication is generally non-existent. A few small boats, none of which appear particularly seaworthy, ply trade between some of the islands without any discernable schedule but the only realistic method of travel is in an open 19 or 23 feet dinghy with a 40 horsepower outboard engine. Getting significant quantity of 200 litre drums of dinghy fuel to the right island at the right time using infrequent boat transport presents something of a challenge.

Although the islands are stunningly beautiful, idyllic pictures don't show sandflies on the beach, *Oecophylla* ants in the forest – some sadistic pleasure was experienced in taking samples of weaver ants for Harvard University molecular and faunistic research – or the ubiquitous mosquitoes on/in both. Nor do tourist photographs adequately



The standard mode of transport for local people throughout the island is the sailing canoe, subject to the vagaries of wind and sea. Sailing canoes are often 'stuck' for days or even weeks when there is no wind. A sailing canoe leaves a natural harbour on the north coast of Panasia in the Calvados chain

The blinding white sand on Manugam, a new island that first appeared in the 1980s – the Calvados chain can be seen in the background.

Although the islands are stunningly beautiful, idyllic pictures don't show sandflies on the beach, *Oecophylla* ants in the forest – some sadistic pleasure was experienced in taking samples of weaver ants for Harvard University molecular and faunistic research – or the ubiquitous mosquitoes on/in both. Nor do tourist photographs adequately illustrate the slippery slopes, sharp coral or the occasional 'hiccup', like the flash floods to which many rivers are seasonally subject. Whilst the islands are healthier than the New Guinea mainland (an entomological colleague carrying out research in the Sepik River area has suffered bouts of malaria, denghe fever, Ross River virus and a rare *Pseudomonas* species virus all in the last 12 months), malaria is rife and bruises and cuts – virtually impossible to avoid in getting in and out of dinghies in choppy conditions and in walking on razor sharp coral – can easily turn nasty without access to antibiotics. In addition to the occasional poisonous snake on the islands, there remain a few salt water crocodiles. There is most certainly scope for adventure of the non-tourist variety.

Typical beach with gently sloping sand, driftwood and dense vegetation on Irai Island, Conflict group.

View along the Calvados chain from the highest point on Motorina Island – the Calvados are barely represented on most maps, and absent from many.



From left to right:
Flash flood on Goodenough Island, D'Entrecasteaux group – this river was crystal clear and ankle deep only a couple of minutes previously;
Difficult gardening/farming conditions on steep slopes on Misima Island, Louisiades;
Many islands have cliffs with steep paths from the beach to an upper plateau where houses are built. This is on the small island of Iwa, the most northerly of the Marshall Bennett group.

A very smart house belonging to the local padre, on Sudest Island in the Louisiades.

An unlucky yellow-fin tuna in mid ocean.

On one occasion, out of sight of land in an open dinghy *en route* to Panomote, north of the Calvados chain, a dark shape was seen over the water about a mile ahead which looked at first like a low island. Large numbers of seabirds, sometimes hundreds, are a common sight as they slowly follow schools of fish across the ocean, but this was unusual. As we drew closer we saw the water was boiling with a large school of yellow-fin tuna with what must have been a massive Attenborough-style bait ball under the surface. There were several thousand birds, not only the usual terns and boobies, but also frigate birds, diving for fish. Our two fishing lines went out, and we chugged into the melèe and were greeted by instant chaos. On one side the line was taken immediately by what was clearly a big fish; on the other side of the dinghy the reel was ripped out of operator's hand and immediately lost as a tuna pursued by a shark hit the back of the dinghy. A massive yellow-fin was eventually hauled aboard, where it did its best to wreck the stern of the dinghy as it thrashed about. We each had as much tuna as we possibly could eat as dusk fell on the beach on the uninhabited island of Panamote, and built a fire to smoke what was left. By any standards this was Adventure.

And the science? Alpha-taxonomy may be a low priority in these days of sexier molecular research, but there is still a massive amount of work to do in providing faunal inventories of places under threat – and so many islands around the world are undeniably under threat for a variety of reasons invariably linked to human activity. Research in 2010 resulted in 1,000+ new island records and an increase in the known distribution of more than 90% of the butterfly species known from the islands of Milne Bay Province. The number of new taxa discovered on the islands in 2010 will not be known until the long process of setting and sorting is finalised, but is estimated at more than a dozen and possibly as many as 30. Accumulated data obtained in 2010, and again in 2011/2012, will facilitate investigation, in collaboration with my friend and mentor Dick Vane-Wright and others, of the biogeography of Pacific butterflies which may be the first detailed study involving insects. It will be interesting to see whether or not there is evidence consistent with Jared Diamond's "community assembly rules", Stephen Hubbell's "unified neutral theory of biodiversity", or neither. Diamond's classic work was on the birds of New Guinea and adjacent islands, and most such studies have been on vertebrates.

Front door to the now derelict Burns Philp building on Samarai Island, capital of PNG prior to Port Moresby. A. S. Meek lived on the island at the turn of the 20th century and later – most of his natural history specimens would have passed through these doors en route to Walter Rothschild's museum at Tring in rather more prosperous times.

So, the question raised in the title remains: scientific fieldwork or self-indulgent Adventure ... or both? You decide!

Above left:On the slippery sides of Tumalimalibee waterfall, Basilaki Island, western Louisiades.
Above right: Camp on the uninhabited island of Panamote in the Louisiades.
Below: Remote Egum Atoll, south of the Marshall Bennett group, from Pandaeweu Island.

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Reaching out: duty, mutual respect and good fun!

OPINION

Adam Hart, Peter Smithers and Greg Masters

Adam studied Zoology as an undergraduate at Cambridge University, then completed a PhD studying ant and bee behaviour under Francis Ratnieks in Sheffield. He is now based at the University of Gloucestershire, where he is active in ecological research and continues his investigations into the social lives of insects, studying captive leaf-cutter ant colonies. Adam is a Reader in Science Communication and was the Society of Biology's Science Communicator of the Year in 2010. He is also a Trustee of the Bee Guardian Foundation, a new education and conservation organisation focussed on bee diversity and a grassroots approach to outreach. A frequent speaker at science festivals and public events, Adam writes a science column for Gloucestershire newspapers, will be the science columnist for Cotswold Life magazine in 2012, and is the resident science "agony uncle" and correspondent for BBC Radio Gloucestershire. He has recently made a programme for the World Service on Honey and will be making further programs for Radio 4 and BBC4 next year.

As science becomes more complex, and our language more impenetrable and jargon-ridden, scientists run the risk of become increasingly isolated from the rest of society. Even within the scientific community it is becoming less and less possible to keep up with advances within a field or sub-discipline yet alone maintain a wider perspective on related fields. If scientists themselves struggle to keep up with advances within their own fields, then the non-scientific community has little chance. The danger is that scientists will become effectively divorced from the rest of society, leading to science (and scientists) becoming less understood, and then misunderstood and finally distrusted. Some forms of the media often re-enforce this stereotype. In general, people trust what they know and understand, so if as scientists we fail to communicate with a wider audience we may eventually lose the trust and respect of society at large. The banking sector provides an instructive example. The world of finance is shrouded in mystery and jargon, and macro-economics is neither an intuitive nor straightforward topic. It doesn't take long for public opinion to change, and at the moment a more vilified sector of our society is hard to imagine.

Another issue related to understanding but operating at a perhaps deeper level concerns role models. While the TV schedules may be full of "science" output, there are relatively few that are presented by bench scientists and most high profile programmes do not feature much of the day-to-day life of a scientist. The scientist as "professional" and science as a "job" is lacking in positive, realistic role models in the media. If scientists are not respected members of our society then how many young people will want to join the ranks? There is a tendency to hold up TV as the ultimate "outreach" tool, but in fact, behind the scenes and with little recognition, many scientists are trying to set examples as positive role models and to open young people up to science as a career. The Science and Engineering Ambassadors Scheme, set up by Lord Sainsbury and now run by local Setpoints, allows professional scientists of all persuasions to work with local schools in developing scientific projects. The Royal Society Partnership Grant scheme works in a similar way and marries up scientists with schools to work in partnership on often quite complex and advanced projects. Another, Speakers 4 Schools, is to be launched this autumn, and was set up by the BBC's Robert Preston. Many universities have outreach departments or individual specialists interacting with local schools and groups, and many grant awarding bodies have clauses that require grant holders to disseminate the recipients' research to a wider audience. Our own National Insect Week and Insect Festival are also good examples of outreach in action (see reports in this issue of *Antenna*).

However much outreach is already being done, there is always room for more and for better. The bottom line is that scientists have to engage with the public more often and in better ways in order to become familiar figures. If random people are stopped on the street and asked to name a sports man or woman, or a TV presenter, there would be a plethora of names. If asked to name a scientist there would likely be an awkward silence followed perhaps by the name of the current BBC "flavour of the month". We have to redress this imbalance and alter the way that scientists, and in our case entomologists, are regarded by the British public.

As a society we already run National Insect Week and the Insect Festival held in York. These are both excellent initiatives but by their very nature they take place at specific and limited times and have a tendency to preach to the converted. There is nothing wrong with this, and outreach must not forget the "converted", but we should think hard

about how we can widen our net. If we are to raise our profile we need events across the year and an approach that will keep the already interested happy while engaging with, and hopefully "capturing", the wider audience.

A wide spectrum of activities is required to catch the public imagination and here in the South West we have explored a range of such events. These have ranged from joint meetings with other societies (which keeps the converted satisfied) to theatre based on entomology (reaching a very different crowd), public lectures and art exhibitions. The following examples are intended to indicate some possible approaches to outreach.

Exploring the aesthetics of the insect world is always popular and we managed to mix the science and art of entomology at the RES Annual Meeting back in 2008. Here we had an exhibition that was simply entitled Insects and Art, opening on the first night of the conference. Delegates were invited to attend a wine reception in the gallery and admire the many artworks that had been inspired by insects. Most were UK artists but we had some exhibits from as far afield as the continent and the USA. Exhibits included paintings, sculptures, prints and photographs (the catalogue is still available from RES Mansion House). This was extremely popular with the public and local schools who attended workshops based on the exhibition. People generally think butterflies are beautiful but are usually unaware of the beauty of other insects and by attracting the public through art it is possible to open their eyes to insects in a way that would not work without the cross disciplinary "hook". Of course, artistic interpretations of insects may grate on the professional entomologist, but such an event is not intended to be explicitly didactic. It is a "taster" and an "eye opener", not a textbook. There are times when we need to relax our scientific rigour slightly and allow people the intellectual space they need to engage with a new topic.

A few years earlier the SW team had worked with the Plymouth Barbican Theatre to produce a contemporary ballet that explored insect movements and behaviours. This was also a great success with a grand opening week end which featured entomological talks and live invertebrates in the bar. There were even a few insect dishes on the menu. The Performance then went on to tour a variety of local venues ranging from the grand elegant lawns of Saltram House (a national Trust property), the Exeter Festival and the dramatic Carnglaze Caverns of Cornwall. Again, a cross disciplinary approach acts as the hook and such activities can be an excellent way of engaging with a new audience. Additionally, by incorporating different types of activities into one event, organisers can vary the level and depth of scientific treatment, from a light touch for the uninitiated to a more in-depth and detailed treatment for those already on board.

We also work with the City Museum in Plymouth to run a family friendly series of monthly natural history based activities. The annual highlight is the bug hunt which now attracts large numbers of local families who enjoy a day as small game hunters. The local bookshop has been known to come along and sell insect books in the field. As professional entomologists we may wince at the term "bug hunt" but this branding (which is the commercial language sometimes needed in outreach) is strong, especially with young people, and is here to stay. "Minibeasts" is another term that can

need to be a little less precious. Explaining to a five year old that "bug" is a specific entomological term for insects of the order Hemiptera is neither useful nor necessary. On the other hand, attracting a five year old child to an insect collecting walk by using friendly and familiar terminology and then helping them to become enthused about finding insects is incredibly useful and very rewarding.

The Children's University is another organisation that is hungry for events and we have run several for them in the past and have several lined up for the future. These range from straight lectures (that can be pitched at all levels of understanding) to some basic insect anatomy and taxonomy in the form of bug building from cups and straws. Simple activities like the latter are powerful tools for helping people understand insect form and function.

Local Schools who obtain Royal Society Partnership grants are also a rich source of interaction. The SW group have had success with this scheme. Pete Smithers worked with a school who investigated the difference between Marine and Freshwater systems. Here they looked at the life found in the waters but also at the invertebrates living on the banks and

behind the beach. Adam Hart worked with a school to investigate the use of different nest structures by the red mason bee *Osmia rufa*. This latter grant was chosen to represent the scheme at the Royal Society's 350th Anniversary exhibition in London, with the science group of 16 students in attendance and talking about ecology, statistics, experimental design and bee diversity with the great and good of science. The only negative comment Adam overheard was from a professional entomologist complaining that there was a spelling mistake in a scientific name on a poster. There is, of course, a time and a place for pedantry, but it this kind of pomposity that does much to harm our reputation with the public.

The recent Plymouth Insect Film Festival was yet another way to bring the public into an entomological arena. Here we showed a variety of insect related films and had a mini version of the insect festival outside the cinema (Antenna 35 (2)). There were many stands and activities on offer including live invertebrates from Dartmoor zoo. The event was opened by the TV presenter (but more importantly, naturalist and entomologist) Nick Baker who stayed and talked to the public across the afternoon. This event is due to run again next year, date TBC.

This diverse range of approaches spread across the year helps to ensure that the entomological message is continually being put across and to raise our public profile. Time, and to a lesser extent money, are the limiting factors and one can only work with what is available. However a commitment to raising the entomological flag at any occasion is always worth considering. If, via these activities, we entomologists we can become well-known members of the community then we will be well on our way to achieving our goals as scientific communicators and ensuring the survival and health of our discipline into the future.

Insect Festival 2011

Julie North, Luke Tilley, Gordon Port, Kirsty Whiteford

A conservative estimate of 1400 people visited the Insect Festival at York on Sunday 3 July, enjoying a glorious summer's day in the Yorkshire Museum Gardens and Hospitium.

This year there was more focus on the exhibits and activities, with marquees hired for a more substantial outdoor activities area. There was a continuous stream of visiting children (and adults) wishing to take part in face painting, insect model-making and insect hotel design.

Under the experienced guidance of Drs Roger Key, Rosie Key, Peter Mayhew and Peter Smithers, the minibeast hunts were hugely popular, averaging 35 participants every 45 minutes. Children and adults arrived armed with improvised sweep nets and other collection equipment made at the OPAL stand.

'Buzzing Borders' generated much interest in attracting beneficial insects to the garden, where visitors were given the chance to take part in a live garden survey.

The NIW display of winning photographs from the 2010 competition had its own marquee, allowing visitors to browse the stunning collection at a more leisurely pace.

The marquee also displayed winning drawings from the Schools Art competition (plus access to a folder of all the 400+ entries) and doubled up as the stage for the prize-giving ceremony by the RES President.

INSECT FESTIVAL 2011
INSECT ART COMPETITION RESULTS

4-5 Years				
1st	Bethany Issatt	5 Years	Cliffe Vc Primary School	Dragonfly
2nd	Ryan Pattison	5 Years	Holy Trinity Ce Infant School	Grasshopper
3rd	Tia Carter	5 Years	Kirk Sandall Infant School	Butterfly
6-7 Years				
1st	Daisy Hemming	7 Years	Burnt Yates Primary	Honeybee
2nd	Ellie Millington	6 Years	Cliffe V.C. Primary School	Dragonfly
3rd	Grace Kerr	6 Years	Elvington Primary	Butterfly
8-9 Years				
1st	Lucy Jones	9 Years	Warmsworth Primary School	Butterfly
2nd	Levi	9 Years	Park Primary School	Dragonfly & Butterfly
3rd	James Oxford	8 Years	St Martins C.E V.A Primary Fangfoss	Ant
10-11 Years				
1st/Overall	Alex Feather	10 Years	Kildwick C.E Primary School	Stag Beetles
2nd	Myles Wilkinson	10 Years	Linton-On-Ouse Primary School	Wasp
3rd	Manuel Almansa	11 Years	St Martins Ampleforth	Butterfly

In the Hospitium were 27 exhibits, spread over 2 floors. These ranged from the Yorkshire Wildlife Trust and BENHS to exhibits from the Manchester University Museum and Yorkshire Museum entomology collections.

We had previous exhibitors returning, such as the Thorne and Hatfield Moors Conservation Trust and the Yorkshire Naturalist's Union but also a good representation of research organisations such as Fera and Institute for Animal Health, Pirbright. The latter exhibit formed part of our theme for this year, CSI (Crime Scene Insects), along with Derby University's Forensic entomology section.

Other new exhibits included the Riverfly Partnership, fossil insects, a natural history artist and 'Creepy Crawlie Cupcakes'.

Support from the RES President, Stuart Reynolds and other RES Officers Lin Field, Jim Hardie and Hugh Loxdale was much appreciated and their hands-on approach was certainly in the spirit of this activity-oriented event! As usual the RES HQ staff were outstanding, both in the preparation for the festival, but in running things on the day.

We had an army of cheerful volunteers, working in the grounds and inside the Hospitium, taking turns at face painting and leafleting at strategic points in York itself.

It was noticeable that the event was extremely well attended throughout the day – in 2009 there was a peak around midday but numbers dropped off markedly around 3pm. IF11 was busy throughout the day, right up to closing.

Feedback on this year's event has been overwhelming. Praise for its smooth running has been a repeated theme and is due partly to the IF Team knowing what to expect and having a system in place from 2009 that worked well.

On behalf of the IF11 Team, we would like to thank all supporters, helpers, exhibitors and visitors in making this event the success it most definitely is.

One final note: A parent told us that after attending IF09 his child had kept a poster and put it up on his bedroom wall. Apparently, he could not wait for the next one, regularly checking the IF page on the RES website for updates. When the IF page eventually went live, he shouted 'It's here!! The Insect Festival is here!!'.

Meeting Reports

‘Invasive insects: implications for plant health, animal health, public health and the environment’

Meeting report from the Northern Ireland region

Invasive species are considered the second most important factor in the loss of indigenous biodiversity after habitat destruction. A recent report has suggested that the cost of invasive species to the EU is estimated at €12 billion per year. Global trade, refrigerated transport and a warming climate are all factors that increase the likelihood of invasive insects establishing. Ireland, on the edge of Europe, has typically benefitted as an island and also because invasive species are usually seen in GB before they make it across the Irish Sea. However, it is also possible that some invasives will make it into Ireland directly, through the major seaports or through air carriage.

Under the auspices of the Royal Entomological Society and hosted by the Ulster Museum, a one-day conference on ‘Invasive Insects’ was held in Belfast on 30th June. The conference attracted about 50 delegates from across Ireland and from a range of disciplines, including, agriculture, environment and medicine. Peter Brown (Anglia Ruskin) kicked off the meeting with a comprehensive review of the problems posed by the invasive harlequin ladybird, which, although common in southern England, has only a few records in Ireland. Sérgio Moreira (IT Carlow) then talked about the dangers of importing non-native bumble bees for pollination. Whilst these may be the same species, they are a different sub-species to native bumblebees and can therefore dilute locally adapted characteristics. Roy Anderson (formerly of AFBI) gave a historic perspective on beetle invasions of Ireland and commented that whilst some invasives are unwelcome, others may be in the gradual process of recolonising Ireland post-glaciation.

Speakers and convenors of the meeting. Left to right: Jolyon Medlock, Roy Anderson, Stephen Jess, Thomais Kakouli-Duarte, John Kelly, Sérgio Moreira, Peter Brown, Archie Murchie

Jolyon Medlock (Health Promotion Agency) gave an overview of invasive mosquitoes in Europe and the dangers they pose through carrying diseases like dengue, chikungunya and West Nile virus. John Kelly (Invasive Species Ireland) explained some of the challenges facing policy in this area and how there are often conflicting requirements in terms of protecting agriculture and/or the environment whilst still maintaining free trade. Stephen Jess (AFBI) followed up this theme by looking at invasive insects as plant health pests and giving examples of how legislation is enforced and the sometimes unexpected pathways by which invasives can enter, e.g. the western corn rootworm, an American pest, entered Europe during the Bosnian conflict of the 1990s, presumably in corn shipments with American troops.

This was a diverse and wide-ranging meeting on the topic of invasive insects, which although concentrating on the problems of these species, did as well bring out some of the positive aspects of invasion. It is, after all, a natural process although greatly accelerated by man’s activities. Thanks are due to the Ulster Museum for hosting the meeting in their splendid and recently

4th International Symposium on the Environmental Physiology of Ectotherms & Plants

Stuart Hands
University of Birmingham
(Photography: Megan Coombs)

In July this year I was fortunate enough to attend ISEPEP4 in Rennes, France. For economical reasons and because it had seemed like a good idea at the time, two colleagues and I decided to travel by ferry and to camp. Unfortunately bad weather in the English Channel meant that we had an epic sixteen hour journey and that we did not arrive in Rennes until one o'clock in the morning! Once we had found our torches and pitched our tent we all hit the hay, exhausted but looking forwards to the start of the conference. The next morning feeling remarkably refreshed for such a short nights sleep and having brushed up well, considering that we were staying in a field, we headed to the University of Rennes.

Fortunately the first day was quite a leisurely start so we had plenty of time to register, hang our posters and find a coffee before the introductory talk at ten to eleven. David Renault, the conference convenor, welcomed us all and gave out all the usual housekeeping information needed for these things to run smoothly. There were approximately 90 delegates attending from 26 different countries, although most of us were to deliver talks the presentations were spread over four days which meant there was no need for parallel sessions so we could all attend every talk.

The theme of the first day was Anhydrobiosis and Desication, which Alan Tunnaclife started off with his keynote address. This was an excellent introduction to the topic, which is one I had previously known little about and meant that the two shorter talks which followed did not go entirely over my head. We had a wonderful buffet lunch and, of course, as we were in France this was served with a glass of red wine. The afternoon started with the second keynote address, delivered by David Macherel, it was on a much more specific topic than Alan's and focused on the role of mitochondria in anhydrobiosis. The majority of the afternoon was then taken up by shorter talks but all still on the theme of anhydrobiosis and mostly focusing on work in Chironomids. The afternoon ended with our first poster session, this was a wonderful opportunity for me as a PhD student to get feed back on my work from some leading lights in the field. Once all the posters had been studied and their owners thoroughly cross examined we moved onto an icebreaking session with wine and canapés, in the grandly named Professors' Club.

Some of the beautiful timber framed buildings in Rennes

The second day focused on low temperature biology of ectotherms and diapause. Brent Sinclair kicked the day off with a keynote address on mechanisms of chill tolerance in insects, in which he presented some interesting findings on the role of the gut in chill injury. Brent has a huge enthusiasm for his subject which could not help but rub off on all of us who were listening. This was followed by two talks on molluscs, but after the coffee break it was back to insects with short talks on the low temperature biology of Lepidoptera and Coleoptera. We had another leisurely lunch before the afternoon started off with an overview of Diapause from Scott Haywood, who drew our attention to the specific threat that climate change posses to the phenology of diapausing insects. For the rest of the afternoon we enjoyed some fascinating short talks on a range of insect related subjects from diapause in *Calliphora* to clock genes in over wintering *Culex pipiens*.

Having fully recovered from our epic journey we were able to spend our

The stunning Mont Saint-Michel

The Birmingham Post-Grad Contingent

second evening enjoying the sights of Rennes, the town centre was just a short bus ride from the university campus where we found a nice restaurant in a old part of town. We enjoyed an intimate meal with a small group of other PhD students after which we found a welcoming little bar and befriended some locals. The third day was the mid point of the conference and had been set a side as a rest day. Unfortunately after some excessive 'networking' the previous evening I was feeling a little jaded and was not up in time the make the 7:30 bus for the excursion to Mont Saint-Michel. However I gather from colleagues who did make it that despite the wet weather it was as beautiful and overcrowded as we are lead to believe!

The forth day focused on Metabolomic aspects of stress tolerance; fortunately this was not as *Drosophila* heavy as it could have been. We had keynote addresses from Anthony Zera and Jesper Sørensen as well as a wide range of short talks on everything from the gene *Frost* to the endemic amphipods of Lake Baikal and the metabolism of wood frogs during freeze-thaw cycles. The day was rounded off with the conference farewell dinner which took place at a restaurant in the town centre. We had about an hour between the last talk and the meal so we joined up with some other PhD students for a pre-dinner drink before rejoining the older delegates at the restaurant. To start with there was tapas and sangria in the bar area, which provided a wonderful opportunity to network, the rest of the meal was then done in a buffet style which again provided plenty of opportunity for circulating between tables and chatting to new people. However, despite such exuberant networking I'm still searching for a suitable post-doc opportunity.

The last morning of the conference was themed around environmental and applied aspects of ectotherms research; I gave my talk on the low temperature thermal thresholds of the tomato leafminer, *Liriomyza bryoniae*, and its parasitoid, *Diglyphus isaea*. As a PhD student being able to give a talk at a high profile international event was a wonderful opportunity not only to showcase my research but also to get feed back on it. There were also talks on freeze tolerance in copper adapted earth worms and the suitability of *Phytoseiulus macropilis* for use as a biological control agent. The day ended with a presentation on the next symposium which will be hosted by Brent Sinclair in London, Ontario, and the prize giving for best poster and best talk.

Finally I would like to express my gratitude to the President and Committee of the Royal Entomological Society who generously provided me with a grant from the society's Conference Participation Fund which enabled me to attend ISEPEP4.

Verrall Night 2011

Professor Helmut van Emden & Dr Archie K. Murchie

Professor Helmut van Emden

Before the Society moved its headquarters from South Kensington to St Albans, the tradition had developed that the annual "Verrall Supper", organised by the Entomological Club on the first Wednesday in March, was preceded by a special "Verrall Lecture" organised at 41 Queen's Gate by the Society, with those attending the lecture then crossing the road to attend the supper!

When the Society moved to St Albans and used the lecture theatre at Rothamsted Research for its meetings, a clash of the March meeting with the Verrall was avoided by the Society deciding to retain a South Kensington venue (the Natural History Museum) for its March meeting.

The 2011 Verrall lecture was delivered by Prof. Jane Memmott from the University of Bristol and held in the Flett Lecture Theatre of the Natural History Museum. Prof. Memmott's talk was on the "The Conservation and Utilisation of Entomological Interactions". Prof. Memmott started off by defining 'entomological interactions', in terms of the role of insects in ecological networks. This included both trophic and mutualistic links between species, for example, predation, parasitism and pollination. The roles of insects in this way are fundamentally important for the broader status of the ecosystem. Prof. Memmott then went on to explain the need to conserve these entomological interactions and if necessary seek to restore them. Prof. Memmott illustrated these concepts with work on the effects of Himalayan/Indian balsam on pollinators, the impact of alien parasitoids on native parasitoids in Hawaii and heathland restoration in Devon. The second element of Prof. Memmott's lecture was the utilisation of entomological interactions and to investigate this she used the examples of parasitoid food webs in organic and conventional farms, and pollination of strawberries by bumblebees. Prof. Memmott rounded off her talk, with a description of an exciting new project on pollinators in an urban environment, which is part of the 'Pollinator Initiative' to address pollinator decline.

Many thanks are due, first of all to Prof. Memmott for delivering a fascinating insight into the role of insects in food webs and how the activities of insects can have profound effects on the environment. Prof. Memmott also neatly demonstrated the relationship between high quality ecological research and very meaningful applied outcomes. Thanks also to the Museum for hosting the lecture and to Dr Andrew Polaszek (Keeper of Entomology) and Ms Esther Murphy for facilitating all arrangements.

2011 marks the 100th anniversary of the death of the Victorian entomologist George Verrall, a member of the exclusive and historic Entomological Club and the man who founded the annual Verrall Supper in 1887, making the 2011 event the 124th anniversary of that foundation. The gathering on 2nd March of the Verrall Association of Entomologists, the "friends of the Verrall Supper" whose annual subscriptions fund the evening, was therefore a bit different from usual, and included a unique display of the originals of some of Verrall's publications. The Entomological Club is very grateful to Dr Malcolm Smart and some of his colleagues for organising this unusual and "once only" opportunity for the rest of us.

The meeting area had been partly cleared of furniture to give more room for us to circulate, and both the general and wine bars thankfully ran smoothly with no long queues, as rather spoilt the 2009 evening.

The menu for the dinner at 7.30 was rated particularly highly by many of those who attended and made their views known to Club members. The starter was a tasty smoked fish terrine with a lemon-dressed salad (a Stilton and spinach filled mushroom with a hot sauce as the vegetarian option). For the main course we enjoyed a beautifully cooked and moist roasted duck breast on a wild mushroom roulade and vegetables – yum yum (a delicious and ample roasted vegetable tatin with basil being available as an alternative). The dessert just happened to be a favourite of mine – creme brulée with berries and a raspberry compôte.

Dr Chris Lyal chaired this year's event and, after the loyal toast, he called on Malcolm Smart to mark the Verrall anniversary by saying a few words about

Networking around the bar before the supper.

The display of George Verrall's publications.

anniversary by saying a few words about our founder's contribution to dipterology. This led nicely into our other traditional toast – that to the memory of the Founder.

Sadly, no Verrall escapes news of the death of members of the Association in the previous year, and this year we stood in memory of Dr Peter Skidmore and of Professor Michael Way (Imperial College and a member of the Entomological Club since 1983). Professor Way was a distinguished applied ecologist and an Honorary Fellow of the Royal Entomological Society. Obituaries for both these well-known colleagues have already appeared in recent issues of *Antenna.*

Meal over – back to networking.

On a happier note, it is always a pleasure to welcome overseas entomologists attending the Supper while on short visits to the UK. We can usually welcome at least half a dozen such visitors with riotous applause (the audience by then well lubricated), but for some reason 2011 had brought us only two (and therefore particularly welcome) visitors to applaud, for neither of whom this was their first attendance. Dr Steve Clement of Washington State University had enjoyed the evening in 2010 so much that he had returned at the first opportunity, and Dr Pernille Joendrup from Copenhagen is already a regular member of the Association.

Last year an overseas visitor, Professor Kim (President of the 2012 International Congress of Entomology in Korea), generously donated some money to the Entomological Club to support student attendance at the Verrall Supper. This year the Club was very pleased to award two "Kim's scholarships" on the basis of the cases made by their supervisors. The two recipients of these grants were Kristin Tremewan of Imperial College and Toby Fountain of Sheffield University, Additionally, the Club is very grateful to one member of the Verrall Association who paid a double subscription specifically to sponsor another "scholarship", and the Club awarded this to Cathleen Thomas of Hull University. Professor Kim's money will not last many years; how nice it would be if his original idea were now perpetuated with sponsorship by members of the Association!

There is no doubt that inflation of the costs of holding the event at Imperial College is reducing the numbers of those entomologists supporting the Verrall Association. Like all other universities, Imperial needs to increase its income, and so is raising its prices to outsiders to what the market in London can bear rather than by any measure of annual inflation.

We may yet have to look elsewhere, but the quality of the experience and the private facilities at Imperial made available for our sole use on the night are superb. Thankfully, Imperial have offered not to increase their prices for 2012.

To finish on a personal note: I started running the Verrall in 1973, so 2012 will be my 39th Verrall and by 2013 I would be almost an octogenarian. Starting at the age of 29, I have been by far the longest-serving organiser in the history of the Verrall. It is time to ensure a smooth transition to a successor, and 2012 will therefore be the last Verrall when the invitations bear my signature. I will be handing over to the new Verrall Member of the Entomological Club, Dr Simon Leather of Imperial College. We will work together on the 2013 event, and after that he will have sole charge. I am just very grateful to all my Verrall friends for their support during my stewardship of the event.

Society News

Council Matters June 2011

Dr Tilley, at the President's invitation, gave a final update and overview of the forthcoming Insect Festival, which was held in York in July. Various arrangements, including a list of exhibitors, competitions and presentations were discussed and finalised. The Hon. Secretary then spoke to the annual report of the Meetings Committee. In particular, he commended the SIG convenors who continue to provide a full programme of meetings and the Postgraduate Forum, which now occupies a regular two-day slot in February. The Registrar spoke to the annual report from the library. He commented on the digitisation programme. [Out-of-print Handbooks can be accessed on the website at www.royensoc.co.uk/publications/index.htm]. Prof. Blackshaw asked about the library usage figures given in the report. The Registrar explained that these are in line with previous years, but that the librarian and Committee continually seek new mechanisms for disseminating library material. It is an area in which there are many changes due to the 'digital revolution'. No nominations for Honorary Fellowship awards had been received, so the President invited Council to consider suitable candidates for the October Council meeting. A proposal concerning development of the Bug Club Magazine (which is jointly run with the Amateur Entomological Society) was presented to Council. After deliberation, it was decided to support development of the Magazine subject to more detailed scrutiny of costs and targets. Lastly, the President expressed sincere thanks to the Trustees retiring at this year's AGM (as detailed below).

Annual General Meeting 2011

The AGM was held in the RES Mansion House, with 25 Fellows / Members and one guest in attendance.

As is customary, the President invited any Fellow present to sign the Obligation Book, if they had not already done so. Dr Deborah Wright duly did so and was formally admitted by the President. The Honorary Secretary, Dr Archie Murchie, summarised the Annual Trustee's report, outlining on slides the structure and outputs of the Society, including a summary of the meetings programme, publications and awards. He finished by mentioning the Society's outreach activities to younger entomologists through the likes of the Insect Festival, Bug Club and Moths Count. Prof. Jim Hardie, Honorary Treasurer, gave his report on the Annual Accounts. He especially drew attention to any item in the accounts that had shown significant change during the year. All-in-all, the accounts are very favourable, but it is unlikely that future costs could be constrained at the same level as in previous years and that our income from investments is unpredictable in the current economic climate. The Auditor, Mr Neil Grimon, confirmed that the accounts were a 'true and fair view' of the Society's financial situation.

The President announced the journal award winners and the winners of the student essay competition (as listed in *Antenna* 35 (3)). The Marsh Award for Insect Conservation was awarded to Mr Steve Cham for his work on Odonata. The Alfred Russel Wallace Award for outstanding PhD thesis was awarded to Dr Katherine Louise Barry, Macquarie University, for her thesis titled 'The Behavioural and Evolutionary Ecology of Praying Mantid Mating Systems'. Both Mr Cham and Dr Barry were presented with their Prizes by the President at Ento'11.

The President expressed much thanks to the outgoing Trustees, Prof. Rod Blackshaw, Dr Keith Walters and Dr Scott Johnson for their diligent and valued contributions to Council. The President also gratefully acknowledged the assistance provided by the Registrar and Society staff, who work away tirelessly behind the scenes. In accordance with the Bye-Laws, Dr Simon Leather, Ms Cathleen Thomas and Mr Duncan Allen were duly elected to Council. The President advised that he wished to propose Prof. Jeremy Thomas to serve as President Elect. The proposal was carried with acclaim. Finally, the President advised that the Honorary Treasurer, Prof. Jim Hardie, would stand down at this AGM to take up the post of RES Director of Science. The President warmly thanked Prof. Hardie for his hard work and careful approach to the finances of the Society. Dr Hugh Loxdale was then elected to serve as Honorary Treasurer of the Society.

Archie K. Murchie (Hon Secretary)

Prof. Michael Reiskind (Oklahoma State University) being congratulated by the President, Prof. Stuart Reynolds, for winning the Society's academic award for best paper in the journal of *Medical and Veterinary Entomology* 2009-2010.

In 2012, National Insect Week will be celebrating **GREAT** BRITISH INSECTS, their diversity, natural history, ecology, and importance to science.

NIW NEEDS YOU

Do you have an interesting piece of research that you would like to publicise during National Insect Week 2012? The organisers would like to hear from you to engage the public with insect science and the importance of entomology.

Would you like to organise an event or register an event that is happening during or around National Insect Week? The aim of NIW is to raise awareness and understanding of the importance and fascination of insects, and the vital role they play in our world. In previous years, hundreds of successful events and activities have taken place during National Insect Week to further that aim. Help us to repeat this success by getting involved.

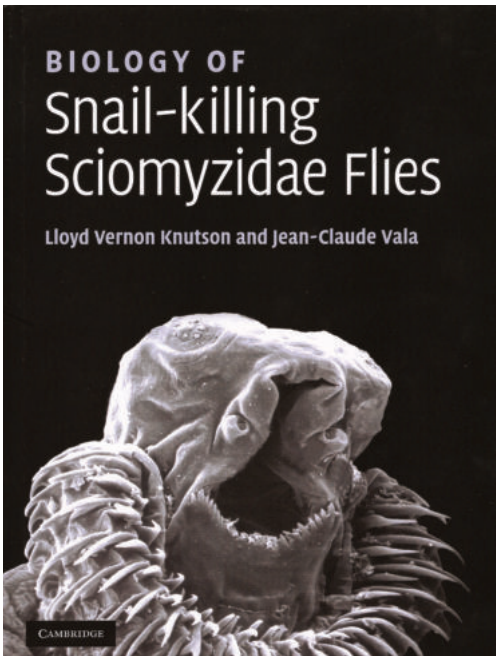
If you would like to discuss any aspect of National Insect Week, please contact the NIW Coordinator, Dr Luke Tilley - **luke@nationalinsectweek.co.uk**

To register an event and for more information, please visit the official website:

WWW.NATIONALINSECTWEEK.CO.UK

National Insect Week is a Royal Entomological Society initiative, supported by a large number of partner organisations concerned with many aspects of insect science, natural history and biodiversity.

Book Reviews



Biology of Snail-killing Sciomyzidae flies

Lloyd Vernon Knutson and Jean-Claude Vala

xix+505pp., Cambridge University Press. Hardback, price £85

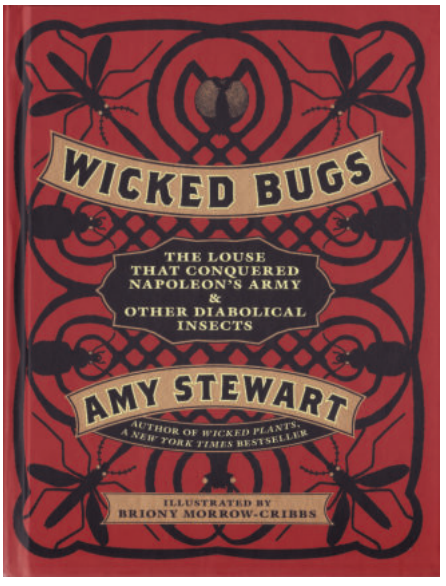
ISBN 978 0 521 86785 6

Sciomyzidae are among the more beautiful flies. From the 19th Century onwards there were reports of their larvae feeding on dead snails and pupae being found in empty snail shells. However, it was not until Berg's report of 1953 that it was realised that some larvae of these flies were killing the snails. Since then his former students and others have transformed our knowledge by demonstrating that the larvae are now known, with a few exceptions, to be feeders on molluscs. Furthermore, while a few feed on dead snails or bivalve molluscs, most are now known to be predators or parasitoids of living molluscs, be they aquatic or terrestrial.

This book critically reviews our current knowledge, including larval habits and host/prey preferences, phenology, reproduction, development, enemies, population dynamics, evolution and much more. Keys to genera for each biogeographic region, along with a guide to the literature for species identification, a world checklist of species, and a chapter on methods will allow anyone to embark on the study of these flies. A critical review of the risks and results of attempts to use sciomyzids for the control of snails that are pests or are hosts of pathogenic helminths and a brief history of the study of these flies completes this extensively illustrated review.

While the extent of our current knowledge of these flies falls short of a medically important family such as mosquitoes, this is one of the fullest accounts of the biology of any family of flies yet to be published, and this transformation has occurred in the last half century. The book is destined to be the springboard for the next half century of research on these attractive and intriguing flies.

Henry Disney



Wicked Bugs. The Louse that conquered Napoleons army & other diabolical insects

by Amy Stuart

Timber Press

ISBN 13 978 1 60469 294 5

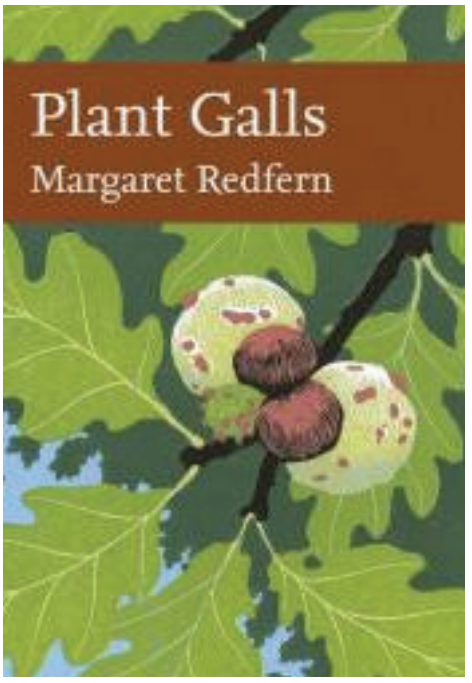
£10.99

Amy Stuart has brought together a collection of fascinating facts, historical anecdotes, stories and myths that outline the darker side of entomology. Wicked bugs is a fascinating insight into the negative impact that invertebrates have on human society. The book is divided into fifty short chapters each of which deals with a particular group of invertebrates or a particular relationship with man. Titles range from the descriptive, Bed Bug, Black Widow & Death-watch beetle to the more enigmatic I've got you under my skin, the enemy within & Zombies. These stories range from the discovery and rise to infamy of the Colorado beetle to a plea that the dread Brown Recluse spider is innocent of most crimes it is accused of. From which invertebrates eat books to what did the Marquis de Sade feed to his lovers. The stories possess a dark humour which offset the negative nature of their wicked behaviour.

The negative message is also mitigated in the introduction where the author acknowledges that insects play a vital role in the maintenance of our planet and hopes that the reader will gain an insight into which invertebrates are to be admired and which avoided.

Wicked Bugs is great fun, a delightful, informative and amusing collection of entomological tableaus. Entomologist will find it a fascinating read and we hope that a wider readership will not see it as a revelation that insects are a dark force in the natural world but as an insight into the strange and mysterious world of the invertebrates.

Peter Smithers



Plant galls

Margaret Redfern

The New Naturalist Library

London: Collins

ISBN: 9780002201438 (hb, £50), 9780002201445 (pb, £30)

Warts and all

I distinctly remember my first gall. It was a bedeguar, the robin's pincushion, on a wild rose in the garden. I must have been 12 or 13 at the time, and I was fascinated by the bizarre science-fiction action of the tiny gall wasp, usurping the plant's normal growth patterns to create such a diabolical new structure.

I've been fascinated by galls ever since, but it was always a frustration that there was very little on them in the way of textbooks or identification guides for the general naturalist. This dearth has been reversed of late. What with Redfern's (and colleagues') Naturalists' Handbook (Richmond Publishing, 1998) and Aidgap key (Field Studies Council, 2002/2010), the field worker is now armed to name and understand most British species, and there are several more technical biological monographs available too. So it was with great anticipation that I awaited this *New Naturalist*.

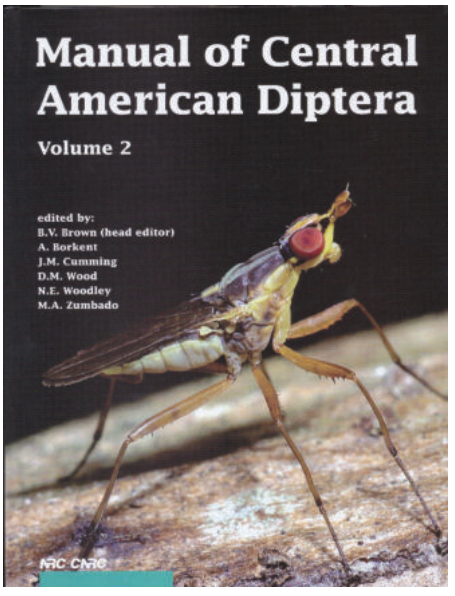
There is no doubt that this encyclopaedic book contains a vast amount of information on galls, from the simple tangled virescences and witches brooms, through ever more elaborate folds, rolls, blisters and pouches, and into the chambered galls like my bedeguar. I am delighted to read about the cat's bollocks (yes, hairy and ball-shaped) made by the gall-wasp *Liposthenes glechomae* on the leaves of ground ivy. And I am pleased to discover that the familiar knopper galls, formed by *Andricus quercuscalicis* on acorns, have finally acquired their fair share of parasitoids and inquilines. Every new shape is curious and startling, and I vow to spend more time searching out galls in the future.

The book is large, and everything I need to know about galls is here, but therein lies a serious drawback. The book is too comprehensive. There is too much detail. There is too much information. Fellows of the Royal Entomological Society will not (should not) be put off by this. But 'the general reader' addressed in the blurb facing the title page will feel sorely hard done by. I'm afraid I feel that the publishers and editors have failed to deliver to their claimed target audience.

So much fine scientific detail has been packed in, that, in the end, no easily readable synthesis of plant gall biology emerges. The book is littered with endless tables, and small-print text boxes that go on for pages. Far from helping clarify scientific points these constantly interrupt the narrative, breaking the train of thought. Most of the diagrams are small and mean, verging on the illegible; some are little more than thumbnails. At 574 pages, perhaps the publishers were desperately trying to cram it all in.

It is only towards the end of the book, in the two final chapters on 'Galls and people' and 'Galls in history', that the author's voice proceeds without interruption, and I found this the most readable and interesting part of the whole volume. Here, too, the line illustrations were clearer — a strange irony since most of them are from 16th and 17th century herbals. In the end I am disappointed with the book's productioc, and disappointed, too, that I have a reference book rather than an interesting read.

Richard A. Jones



A manual of central American Diptera, volume 2

Edited by Brian V Brown et al

Published by NRC Research Press

ISBN 139780660199580

Price $94.95

This is the second half of this major work and I am sure that it has been eagerly awaited. It has been produced to the same high standard as Volume 1 and deals with the sixty four families not covered in the first volume, Platypezidae to Tachinidae. Most chapters contain keys to genera, a suite of superb illustrations and references. My comments on the first volume all apply to volume two (Antenna Vol 35 (1)). Whist this two volume work is aimed at entomologist who are studying the central American fauna, the combination of the well-produced keys and the wider coverage of many chapters mean it will also prove useful to anyone with even a general interest in diptera. It is highly recommended.

Peter Smithers

A Complete History of the Butterflies and Moths of Sussex

by Colin Pratt

This work is founded on the 1999 CD "A Revised History of the Butterflies and Moths of Sussex", and all of those enthusiasts who were kind enough to have bought that effort should view this current work as an updated hard-copy paper version with the addition of the histories of the micro-moths – due to subsequent technical advances, such large works can now be printed at a price much reduced compared to that time, although they still cost a significant sum.

Buyers will have already read the introduction and history of each of the butterflies, the larger moths, and the pyralids and plumes, up to the end of the 20th century, but in this new account a significant amount of updated text has been added and a whole new set of distribution maps has been drawn up for almost every species by individually-tailored date-class running up to 2009/2010. Moreover, for the first time ever, a detailed critical history of each of the county's micro-moths is presented, this being an investigation into the 1,213 species which have been claimed to occur here. As the "Complete History" now examines the past of every lepidopteron ever recorded in Susses – almost 2,000 different insects – even after allowing for the unavoidable blank spaces on some pages, it amounts to the equivalent of more than 1,500 A4-sized pages and contains 1.4 million words. Presented in three weighty volumes, this is the largest such work ever compiled for any county in the British Isles.

Volume One commences with the CD introduction that encompasses the evolution of the study of butterflies and moths in Sussex, including chapters on the technical advances in collecting and recording, the 19th century's infamous specimen dealers, photographs and brief biographical details of our foremost, scientific, amateur, and professional collectors, and the modern-day recorders; a large and profusely illustrated section of chapters is also included on the history of all of our leading hunting-grounds – over 500 historical topographical monochrome photographs of the most important habitats are reproduced, these being supplemented by sequences of more than 100 geographical maps, some originally drawn as far back as the 16th century. This volume ends with the new 430 page section on the micro-moths, which includes well over 1,000 pioneering distribution maps. Modern nomenclature dictates that Volume Two encompasses the histories of the pyralids and plumes, the butterflies which approach 200 pages alone, and the geometer moths, this extending to almost 600 pages in all. Volume Three covers the hawks to the fan-foots, is followed by a summary and analysis of the results, and runs for nearly 500 pages.

Every locality ever publicly known for every butterfly and moth is represented. Dating from 1768 to June 2011, all of the most important Sussex records are individually listed by date, locality, and viewer, and if necessary discussed, this being the case in more than half of the butterflies and macro-moths, and for just about all of the micros. Extinct, declining, and colonising species are dealt with in especial detail. In all, the books include around 3,000 updated distribution maps to the definition of a two kilometre square, depicting well over 100,000 records. Dozens of statistical bar charts illustrate the annually-changing levels of immigrant Lepidoptera since the middle of the 19th century, and many more depict the numerical changes that have taken place within the more volatile of the macro=moths over the past 41 years from the longest-running nightly-counted single locality mv-sourced moth trap in the UK. Historically accurate average and extreme flight-times in Sussex, and lists of our own feral food plants, have been collated for every species. The individual limits of variation and all of the known races, forms, and major aberrations of every adult macro-lepidopteron are also delineated, the changing proportion of melanism here being fully explored. All of this is rounded off with a list of the 4,000 published references to Sussex entomology referred to in the text.

This is a detailed reference book which should provide perspective for current enthusiasts and base data for researchers. But the fundamental purpose of the 'Complete History' is to maximise the chances of the viable survival of as many of our butterflies and moths as possible, so that later generations can also wonder at some of the sights that I have been privileged to see and recall from the past 60 years. To this end these volumes are being produced on a non-profit-making basis – I am acutely aware that financial restraints can affect the spread of knowledge and enthusiasm, this especially being the case with the young who are the seed-corn for the future.

The price for each set of three volumes is £65.00; part-sets will not be available. Due to their size and weight the estimated cost of postage is approaching £13 and specialised book packaging for the three volumes another £3, so requests for collection will be sympathetically accommodated wherever possible.

The current print run is diminishing however a further printing is envisaged provided there is sufficient interest. This is necessary as Colin has to fund the printing himself and is not a rich man.

Requests for orders should be directed to:

Colin Pratt, 5, View Road, Peacehaven, East Sussex, BN10 8DE

Colin.pratt@talk21.com

REVIEWS:

Rupert Barrington
The UK's leading expert on butterfly variation – this work "provides us with a county history of butterfly varieties and their collectors which is unparalleled in scope and detail. An invaluable record for posterity".

Tony Davis
National authority on pyralid moths – "A uniquely comprehensive analysis of the fortunes of the county's pyralids from Victorian times to the present day".

Neil Hulme
Chairman of the Sussex Branch of Butterfly Conservation and leading county authority on the group – "The definitive work on the Sussex Lepidoptera and an essential companion for the serious enthusiast . . . we live in entomologically exciting times and this fascinating historical account provides context to the butterflies, moths and Sussex localities we can still experience today".

Dr Gerald Legg
Keeper of Biology at Brighton's Booth Museum of Natural History, foremost holder of Sussex reference collections – The 1999 CD "resulted in a massive expansion of knowledge . . . and after tirelessly adding new data, including all the micros, this monumental work is the result . . . the definitive reference book on all of the Sussex moths and butterflies, and their historical localities . . . thought-provoking, and sometimes controversial".

Mark Parsons
National Head of Moth Conservation for Butterfly Conservation and expert on the UK's macro and micro moths – "A huge wealth of information has been drawn together on all Sussex's moths . . . a superb historical document with many fascinating gems of information . . . and an essential resource for future recorders. A tremendous achievement".

Bernard Skinner
Well known author and national authority on the macro-moths – "A monumental work . . . it will undoubtedly remain the definitive reference for enthusiasts of the Lepidoptera of Sussex for decades to come".

British Dragonflies

Graham Sherwin

This DVD covers the 30 or so species of British Anisoptera that include all of the 25 breeding species (plus one subspecies and some forms) and a number of vagrants (5 species) and potential vagrants (3 species). It is the companion DVD to British Damselflies that covers all of the breeding species of Zygoptera and some potential vagrants. There is also a short section on *Coenagrion scitulum*, a Damselfly only recently rediscovered breeding in Britain that did not make it into the Damselflies DVD.

The DVD is broken down into chapters and includes a brief introduction to how to use the DVD. The author directs the viewer to the more comprehensive introduction to the biology of the Odonata in the Damselflies DVD. Each chapter deals with groups of similar species and the chapters can be viewed as a whole or the viewer has the choice of selecting the section dealing with a particular species. It is not clear why some species have been included and others are missing. For instance, *Sympetrum pedemontanum* (one record) and *Oxygastra curtisii* (extinct) are included while *Anax ephippiger* (rare vagrant) is not.

As with the Damselflies DVD, this is not something that you can sit down and watch as a whole as it runs for a little less than three hours. Instead, it is designed more as an identification guide for use to refresh the memory or to check identification features. As such, it is a useful tool that adds an extra dimension to traditional field guide books, the viewer being able to see species from a number of different angles both perched and in flight. Traditional field guides tend to show dorsal and sometimes lateral views and detail. At times the description of the identification features is a little complex as the guide is designed for field observations. For several species pairs or groups (e.g. *Sympetrum* sp.), it might have been useful to include or mention some of the diagnostic in hand features, without which specific identification is troublesome. That said, the use of insets of similar species from the same angle and highlighting specific features is helpful and the images are of such high quality that many features can be seen. For some species groups, all similar members are shown together to allow direct comparison (e.g. for red male *Sympetrum* species). For the majority of species, adults and immatures of both sexes and older individuals are covered in detail in contrast to many field guides.

For each species there is an information page that can be paused to read the details of flight season, distribution and key identification features. There are a number of minor errors particularly with regard to the flight seasons (for instance, you are very unlikely to see *Aeshna cyanea* in April) and some of the distribution maps appear to be out of date. However, these pages are very useful in summarising the large amount of information in the commentary.

As with the previous DVD, the footage is stunning. Most of the images are very crisp, still and well lit and are of sufficient quality to be able to see even subtle or small identification features. There is footage of mating and oviposition for nearly all species as well as comments by the author on various aspects of the biology and behaviour of the species and hints and tips about how to look for particular species.

Overall, this DVD is well worth owning if you have any interest in Odonata be it professional or amateur. I would also say that it is worth investing in both DVDs and there is currently a discount for buying both together (each DVD costs £18.50 or £35 for both including postage until Xmas). For more details see www.gswildlife.co.uk/british_dragonflies.html.

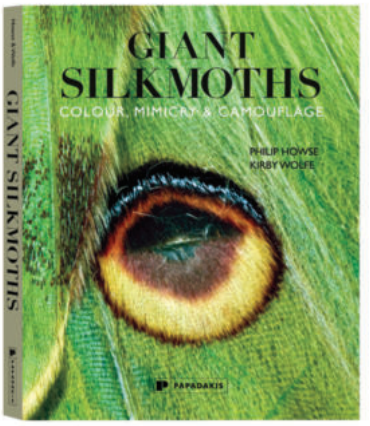
Dr Richard Billington, University of Plymouth

PRESS RELEASE

GIANT SILKMOTHS

COLOUR, MIMICRY & CAMOUFLAGE

PHILIP HOWSE & KIRBY WOLFE



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£25.00

PUBLICATION NOVEMBER 2011

The giant silkmoths include some of the world's largest and most beautiful insects, which are mainly inhabitants of tropical and subtropical forests and are rarely seen except by those that take the trouble to breed them. Their magnificence is illustrated by many outstanding photographs of the live insects by Kirby Wolfe.

The size of the giant silkmoths is a big disadvantage for their survival: being cold-blooded they can fly away only when they have warmed their bodies sufficiently by muscle activity, a process that can take several minutes. During this period, when they are obviously very vulnerable to predators (usually birds), they rely for survival mainly on camouflage and on the effect of confusing and ambiguous designs and patterns on their wings.

In his book *Butterflies: Messages from Psyche* (Papadakis 2010), Philip Howse showed for the first time that the wing patterns of many butterflies and moths have embedded images of bird beaks and claws, snakes, lizards, small mammals and other creatures. We do not normally see them because our vision is different from that of birds and other animals which prey on insects. Insect-eating birds respond to detail rather than the whole picture, and if we focus on details, many more examples of images of other animals embedded in the wing patterns of silkmoths are revealed. In some species, for example, these include features of birds: beaks, eyes, feathers and wings, strongly suggesting that confusion of predator vision has been a significant element in the evolution of moth wing patterns and designs. This defines a new kind of mimicry, for which the term "masking mimicry" is proposed.

Most insect-eating birds see a different colour spectrum to us and see beyond the violet into the ultraviolet that is invisible to us. If we take into account the fact that birds see much brighter reflected light in the blue and ultraviolet range than we do, then more hidden patterns emerge on the wings of many silkmoths: among others, images of birds with outstretched wings and tail fan as if they were about to pounce.

PHILIP HOWSE has published books and research articles on insect behaviour and ecology. He has developed environmentally-friendly methods for the control of insect pests, recognised by a number of awards including the OBE.

KIRBY WOLFE is a Research Associate of the Natural History Museum of Los Angeles County, California, and has spent more than 25 years studying and photographing moths.

For further information or to request a review copy, images from the book or an interview with Philip Howse, please contact Juliana Kassianos: juliana.kassianos@papadakis.net tel: 01635 248833.

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Diary

Assistant Editor: Duncan Allen (e-mail: antennadiary@gmail.com)
Contributions please! Your support is needed to make this diary effective so please send any relevant items to the diary's compiler, Duncan Allen, E-mail: antennadiary@gmail.com. No charge is made for entries. To ensure that adequate notice of meetings, etc. is given, please allow at least 6 months' advance notice.

Details of the Meetings programme can be viewed on the RES 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 usually 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.

MEETINGS OF THE ROYAL ENTOMOLOGICAL SOCIETY

2011

Nov 10 Biology of Lepidoptera

Venue: Rothamsted Research, Harpenden, Herts.
Convenors: Drs Jason Chapman & James Bell
This is one-day meeting covering all aspects of the biology of butterflies and moths, from physiology to population dynamics and flight behaviour.
Contributors include:

Ken Wilson (Lancaster) – Keynote Address
Jason Chapman (Rothamsted)
Richard Fox (Butterfly Conservation)
Melanie Gibbs (CEH)
Jane Hill (York)
Chris Thomas (York)
Jeremy Thomas (Oxford)

Nov 18 Searching for Unicorns, the problems with investigating rare or difficult invertebrates. A joint meeting of the RES and the Peninsular Invertebrate Forum

Venue: University of Plymouth
Convenor: Dr Peter Smithers
Contributors include:

Duncan Allen – The hunt for Nothyphantes, Plymouth's rarest spider
John Walters – Entomology on the run, investigating potter wasps

2012

Feb 1-2 Postgraduate Forum

Venue: University of Liverpool Lifesciences Building
Convenor: Mr Steven Parratt
Contributors include:

Prof. Geoff Parker (Univ. of Liverpool)
Dr Rhonda Snook (Univ. of Sheffield)
Dr Zenobia Lewis (Univ. of Liverpool)

Mar 7 Verrall Lecture

Venue: Flett Lecture Hall, Natural History Museum
Professor Ilkka Hanski (University of Helsinki)
Title: The Glanville fritillary butterfly: ecology meets evolution
Demographic population dynamics, gene flow and local adaptation may influence each other and lead to coupling of ecological and evolutionary dynamics especially in species inhabiting fragmented heterogeneous environments. Studies on the Glanville fritillary butterfly *Melitaea cinxia* in Finland have documented reciprocal influence between ecological and evolutionary dynamics in dispersal, in inbreeding and population extinction, and in female host plant preference and population establishment. The most striking example involves genetic polymorphism in the gene phosphoglucose isomerase *Pgi*, which is associated with dispersal, recolonization and local population dynamics. In this case extinction-colonization metapopulation dynamics influence allele

frequency changes in *Pgi* and vice versa. Eco-evolutionary spatial dynamics in heterogeneous environments may not lead to directional evolutionary changes, unless the environment changes, but eco-evolutionary dynamics may contribute to the maintenance of genetic variation due to fluctuating selection in space and time.

Jun 6 **RES Annual General Meeting**

Jun 25 – 1 Jul **National Insect Week**
National Insect Week (NIW) is coordinated by the Society and supported by almost 40 partner organisations. The aim of NIW is to encourage the public to take an interest in insects as one of the most abundant and accessible forms of biodiversity surrounding us. This is achieved through a variety of talks, 'bug-hunts', demonstrations, open days and workshops.
www.nationalinsectweek.co.uk

Jul 18 – 20 **Ento'12 – the National Meeting of the RES**
Venue: Anglia Ruskin University, Cambridge
Convenor: Dr Alvin Helden

Aug 19 – 25 **ICE 2012 - XXIV International Congress of Entomology**
Venue: Daegu, Korea

Diary of other Meetings

2011

Nov 5 **BENHS Annual Exhibition and Dinner**
Venue : Imperial College, South Kensington
Contact: jmuggleton@aol.com

Nov 8 **Aberdeen Entomological Club**
Pinewood invertebrates – Hayley Wiswell, BTCV
Venue: The James Hutton Institute, Aberdeen
Contact: Jenni Stockan jenni.stockan@hutton.ac.uk

Nov 26 -27 **Dipterists Forum Annual Meeting and AGM**
Venue:The Manchester Museum
Contact: jmuggleton@aol.com
I:(www.dipteristsforum.org.uk).

Dec 6 **Aberdeen Entomological Club**
Tbc – Veronique Forbes, University of Aberdeen
Venue: The James Hutton Institute, Aberdeen
Contact: Jenni Stockan jenni.stockan@hutton.ac.uk

2012

Jan 8 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Jan 10 **Aberdeen Entomological Club**
Soil invertebrates – Hannah Urpeth, BTCV
Venue: The James Hutton Institute, Aberdeen
Contact: Jenni Stockan jenni.stockan@hutton.ac.uk

Jan 21 **An introduction to leafhoppers and allied groups**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Jan 22 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Jan 28 **Nocturnal Ichneumonoidea and Ichneumoninae identification workshop**
Venue: the Natural History Museum
Contact: jmuggleton@aol.com

Feb 4 **Coleopterists' Day at Oxford**
Venue: University Museum of Natural History, Parks Road, Oxford
Contact: jmuggleton@aol.com

Feb 7 **Aberdeen Entomological Club**
Saproxylic Diptera – Iain MacGowan, SNH
Venue: The James Hutton Institute, Aberdeen
Contact: Jenni Stockan jenni.stockan@hutton.ac.uk

Feb 11 **Tachinidae identification workshop**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Feb 12 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Feb 11 **Tachinidae identification workshop**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Feb 12 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Feb 18 -19 **BENHS Regional Meeting**
Venue: FSC Preston Montford, Shropshire.
Contact: pete@field-studies-council.org

Feb 25 **Staphylinidae identification workshop**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Feb 26 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 3 **Hemipterists' Day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 6 **Aberdeen Entomological Club**
Phenological changes in the insect world – Gabor Pozsgai, The James Hutton Institute
Venue: The James Hutton Institute, Aberdeen
Contact: Jenni Stockan jenni.stockan@hutton.ac.uk

Mar 10 **Ground Beetle (Carabidae) identification workshop**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 11 **BENHS Open day**
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 17 **BENHS Annual General Meeting and Presidential Address**
Venue: University Museum of Natural History, Parks Road, Oxford
Contact: jmuggleton@aol.com

BMIG Annual Field Meeting and AGM will be held in March-April 2012. Please consult the BMIG web site for details (http://groups.google.com/group/bmigroup/web/index-2).

Mar 24 Sawfly identification workshop
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 25 BENHS Open day
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Mar 31 Starting Aculeates
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Apr 21 Identifying Ichneumonidae workshop
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

Apr 22 BENHS Open day
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

May 12 One day BENHS Regional Meeting
Breckland Invertebrates
Venue: Elveden, Thetford, Norfolk
Contact: jmuggleton@aol.com

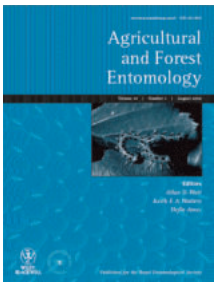
Mar 13 BENHS Open day
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

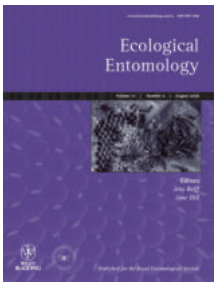
June 10 BENHS Open day
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

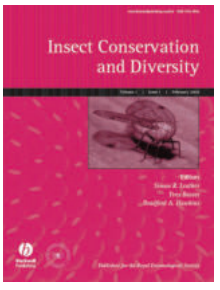
July 8 BENHS Open day
Venue: Pelham-Clinton Building, Dinton Pastures Country Park, Davis Street, Hurst, Reading
Contact: jmuggleton@aol.com

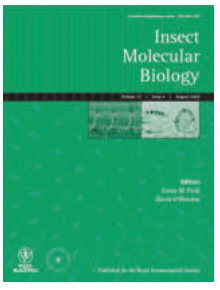
23-29 Combined Annual Meeting of the Lepidopterists' Society and the Societas Europaea Lepidopterologica
Venue: Denver Museum of Nature & Science, Denver Colorado, U.S.A
Registration opens from December 2011

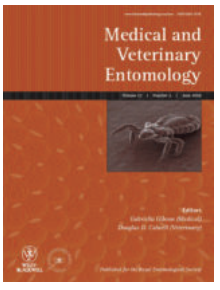
Sep 3 -5 Hedgelink's first International Symposium on Hedgerow Ecology, Conservation and Management 'Hedgerow Futures'
Venue: Staffordshire University, Stoke-on-Trent, UK.
Contact: Dover j.w.dover@staffs.ac.uk

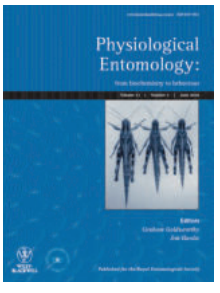


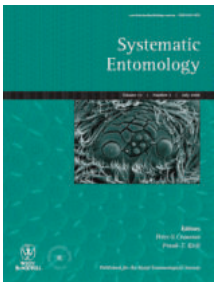












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Agricultural and Forest Entomology provides a multi-disciplinary and international forum in which researchers can present their work on all aspects of agricultural and forest entomology to other researchers, policy makers and professionals.
2012 print or online prices: UK £625, Euroland €1,311, USA $1,908, Rest of World $2,225
2012 print and online prices: UK £719, Euroland €916, USA $1,331, Rest of World $1,551

Ecological Entomology publishes top-quality original research on the ecology of terrestrial and aquatic insects and related invertebrate taxa. Our aim is to publish papers that will be of considerable interest to the wide community of ecologists.
2012 print or online prices: (with Insect Conservation and Diversity) UK £1,031, Euroland € 1,311, USA $1,908, Rest of World $2,225
2012 print and online prices: UK £1,186, Euroland € 1,508, USA $2,195, Rest of World $2,559

Insect Conservation and Diversity explicitly associates the two concepts of insect diversity and insect conservation for the benefit of invertebrate conservation. The journal places an emphasis on wild arthropods and specific relations between arthropod conservation and diversity.
2012 print or online prices: UK £625, Euroland €797, USA $1,157, Rest of World $1,349
2012 print and online prices: UK £719, Euroland €916, USA $1,331, Rest of World $1,551

Insect Molecular Biology has been dedicated to providing researchers with the opportunity to publish high quality original research on topics broadly related to insect molecular biology since 1992. *IMB* is particularly interested in publishing research in insect genomics/genes and proteomics/proteins.
2012 print or online prices: UK £1,043, Euroland €1,324, USA $1,928, Rest of World $2,248
2012 print and online prices: UK £1,199, Euroland €1,524, USA $2,217, Rest of World $2,585

Medical and Veterinary Entomology is the leading periodical in its field. The Journal covers all aspects of the biology and control of insects, ticks, mites and other artropods of medical and veterinary importance.
2012 print or online prices: UK £600, Euroland €765, USA $1,111, Rest of World $1,297
2012 print and online prices: UK £690, Euroland €880, USA $1,279, Rest of World $1,492

Physiological Entomology is designed primarily to serve the interests of experimentalists who work on the behaviour of insects and other arthropods. It thus has a bias towards physiological and experimental approaches, but retains the Royal Entomological Society's traditional interest in the general physiology of arthropods.
2012 print or online prices: UK £553, Euroland €704, USA $1,023, Rest of World $1,194
2012 print and online prices: UK £634, Euroland €810, USA $1,177, Rest of World $1,373

Systematic Entomology encourages the submission of taxonomic papers that contain information of interest to a wider audience, e.g. papers bearing on the theoretical, genetic, agricultural, medical and biodiversity issues. Emphasis is also placed on the selection of comprehensive, revisionary or integrated systematics studies of broader biological or zoogeographical relevance.
2012 print or online prices: UK £996, Euroland €1,267, USA $1,844, Rest of World $2,151
2012 print and online prices: UK £1,145, Euroland €1,458, USA $2,120, Rest of World $2,475

Subscriptions and correspondence concerning back numbers, off-prints and advertising for the seven principal journals of the Society should be sent to the publishers, Wiley-Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ. (customerservices@blackwellpublishing.com)

Antenna (Bulletin of the Society). Free to Members/Fellows. Published quarterly at an annual subscription rate of £40 (Europe), £42 (outside Europe), $70 (United States). This journal contains entomological news, comments, reports, reviews and notice of forthcoming meetings and other events. While emphasising the Society's affairs, *Antenna* aims at providing entomologists in general with a forum for their views and news of what is going on in entomology. Subscriptions and advertising enquiries should be sent to the Business Manager at The Mansion House, Chiswell Green Lane, Chiswell Green, St. Albans, Hertfordshire AL2 3NS and any other enquiries to the Editors.

Handbooks for the Identification of British Insects. This series now covers many families of various Orders. Each Handbook includes illustrated keys, together with concise morphological, bionomic and distributional information. A full list of Handbooks with order form is available. See website www.royensoc.co.uk

Symposia. Nos. 1-3 were published by the Society; Nos. 4-10 by Blackwell Scientific Publications: Nos. 11-17 by Academic Press and No. 18 by Chapman & Hall, No. 19 by Kluwer, No. 20, 21, 22 and 23 by CABI.

Photograph © Andrew Smith

THE ROYAL ENTOMOLOGICAL SOCIETY'S

NATIONAL
insect
WEEK

25 JUNE *to* 1 JULY 2012

…visit www.nationalinsectweek.co.uk to find out more