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Coordinator's notes

As 2015 draws to a close it is possible to reflect upon a very busy and successful year for both the Riverfly Partnership (RP) and Anglers Riverfly Monitoring Initiative (ARMI).

A record number of training workshops were delivered between February and November, ensuring strong growth of both the ARMI volunteer network and of the number of sites regularly monitored by trained ARMI volunteers.

In this issue you will find updates about RP and ARMI, as well as notable contributions from Craig Macadam and Jan Mallik, I hope you find it an interesting read.

ARMI volunteers continue to detect severe changes in water quality, reporting incidents to ecology contacts in the Environment Agency (EA), Natural Resources Wales (NRW), Scottish Environment Protection Agency (SEPA) and Northern Ireland Environment Agency (NIEA) respectively, so that more detailed investigations, further action and feedback can be delivered as appropriate. A continuing and effective ARMI is an essential tool for freshwater conservation in the UK, and is reliant upon the passion and commitment of the entire ARMI network, in particular of all those trained volunteers to whom I extend sincere thanks, on behalf of myself and RP. RP would also like to extend great thanks to the Environment Agency for continued funding support of ARMI, to Salmon & Trout Conservation UK, the FBA, all RP steering committee and executive members, ARMI tutors and coordinators, and to every statutory agency ecology contact.



Merry Christmas and a Happy New Year!

Online data repository

Thank you to every ARMI coordinator who has emailed historic data to me before the yearend. RP and FBA will begin importing those data in the New Year and RP is committed to importing all those data (received by 31/12/2015) by the 31st March 2016. If you are yet to email historic data to Ben please do so at your earliest convenience, contact details are at the end of this newsletter.

RP continues to work closely with colleagues at FBA to deliver improvements to the data repository, some have already been delivered and further significant improvements are expected between now and the end of February as part of a wider web platform system upgrade.

The data repository user guide has again been recently updated and is available upon request to ARMI coordinators and monitors. For your copy (pdf) please email Ben, ben@riverflies.org. For 2016 an introduction to the ARMI database will be incorporated in the ARMI training template and the user guide will be included in the ARMI participant pack.



ARMI hubs

There are now 27 catchment or regional ARMI hubs operating throughout the UK plus one other, established in October in the Republic of Ireland (RoI). The RoI hub is hosted by Limerick City and County Council, which funded two workshops and provided monitoring equipment so that trained volunteers can monitor sites in the Loobagh catchment. This is a particularly exciting development because ARMI has not been established in RoI before now.

If you would like to find out whether an ARMI hub exists near you, or if you are interested in establishing a hub, please visit www.riverflies.org or email Ben Fitch (details below) for more information.



Limerick City and county Council ARMI workshop

Training update

A record 62 ARMI training workshops have been delivered this year which represents a fantastic effort by RP, partner organisations, statutory body ecology contacts, anglers and conservation volunteers alike. Continued growth in the number of trained ARMI volunteers, coupled with that of ARMI hubs nationwide, means there are ever more 'eyes and ears' on UK riverbanks and those 'eyes and ears' play vital roles in both highlighting pollution incidents and recording additional data about stressors to the freshwater ecosystem, such as invasive non-native species (INNS), and ecosystem function, i.e. the effectiveness of in stream habitat projects. Indeed, the discovery of the INNS shrimp, *Dikerogammarus haemobaphes*, in the River Churnet, Staffordshire was made during an ARMI workshop in October by RP tutor Dr Nick Everall (see banner image at top of newsletter).

If you are interested in holding an ARMI workshop or support day please email Ben Fitch (details below) and remember to leave plenty of time when ordering participant packs and monitoring kits (supplied by [EFE & GB Nets](#)).



Exmoor ARMI hub workshop

Riverfly Partnership Conference

RP will host its next conference in the Flett Theatre, Natural History Museum, London, on Thursday 17th November 2016. Details about the theme of the conference and how to register, etc., will be announced in the New Year but please do keep this date free in your diary until further notice.



Publications

Thanks to work led by Dr Angus Menzies, in partnership with Wiltshire Wildlife Trust, Dorset Wildlife Trust and Public Health England, RP hopes to introduce a wallet sized Leptospirosis/Weil's Disease – tick awareness/Lyme Disease card to participant packs in 2016. This will be accompanied by a trifold leaflet containing more detailed information.

On another note, Andrew Griffiths has written an article centred around a recent ARMI workshop on the River Irwell. The article, which will appear in Fly Fishing and Fly Tying Magazine early next year, highlights some of the river rehabilitation work which Salford Friendly Anglers Society and Mersey Bain Rivers Trust continue to deliver in the Irwell catchment, and highlights the importance of ARMI.

Finally, don't forget that copies of the Riverfly Partnership 3 fold leaflet remain freely available for engagement and information purposes, please email Ben Fitch (details below) for more details.



Salford Friendly Anglers Society volunteers on the River Irwell

In a humeral vein

by Craig Macadam

A man turns up at a fancy dress party dressed in a suit and clutching a standby ticket for a British Airways flight to New York. The host of the party asks “What have you come as?”.

The man replies “I’m a mayfly – I may fly tomorrow or I may not!”

Oh, sorry ‘humeral’ not ‘humorous’..... What I really wanted to talk about was mayfly wings.

Mayflies were the first insects to free themselves from the chains of a purely terrestrial life. Their ability to fly has helped them to persist for over 300 million years. But how many of us have looked closely at the structure of their wings?

The basic formula for an insect’s wing is a series of longitudinal veins with a varying number of cross veins between them. The purpose of these veins is to give strength and stability to the wing membrane in flight. We can think of the wing membrane as a piece of paper. If you stand a sheet of paper on its edge it will probably fall over. Similarly if you take an end of the paper in each of your hands and bring your hand together the paper will flex and bend completely. The veins stop the gross flexing of the wing and also support the wing when at rest. Looking closely at the wing you’ll see that the membrane is pleated with the longitudinal veins following an alternating concave – convex pattern. The reason for this is simple. If you take your piece of paper and fold it as if you’re making a fan- fold one way, then the next with about 2 centimetres for each fold. Now stand it up along the folds – et voila! The paper is able to stand upright without support. Furthermore, if you put weight on the top of the folds it can support that weight easily.

So let’s have a closer look at the veins. From the front of the wing is the costal area or costal margin. The first vein encountered here is the costa. This thick, strong vein is the backbone to the wing – think of it like the mast of a sail. The costa is complemented by the sub-costa which typically runs parallel to it. At the top of this section is the pterostigma. This area often contains a number of small cross-veins and can also be shaded or patterned in some way. In some species, such as the Pond Olive (*Cloeon dipterum*), the whole of the costal margin is patterned with brown pigment. In other species, for example *Ecdyonurus insignis* it is only the pterostigma that is coloured. The number of veins in the pterostigma can also be used to separate some species, most noticeably the two *Cloeon* species – *C. dipterum* and *C. simile*.

The next area of the wing is the radial sector. This area is delineated by the branches of the next longitudinal vein – the radius. In the archetypal Ephemeroptera wing the radius has five branches, number R1 to R5. R1 runs parallel to the costa and sub-costa, and runs the full length of the wing. R2 and R4 both branch off close to the base of R1. These veins then branch again towards the centre of the wing to form R3 and R5. The branch between R4 and R5 is termed the ‘outer fork’ and is one of the distinctive features of Ephemeroptera wings.

The radial sector occupies half of the area of the wing. The remaining area, towards the body of the insects is occupied by the median, cubitus and anal veins. The median vein splits into two separate veins (M1 and M2) close to the base of the wing. In the Ephemeridae and Potamanthidae, M2 arches strongly away from the M1 where it splits. This feature helps to separate these families from the Leptophlebiidae and Ephemerellidae.

The cubitus follows the median and also splits close to the base of the vein. The relative distance between Cu1, Cu2 and the first anal vein is important for separating Leptophlebiidae and Ephemerellidae.

The anal veins which vary in number, are largely incidental.

Between each of the major longitudinal veins there can be a number of other minor veins that are connected to the major veins by cross-veins. These minor veins also follow the concave – convex pattern and add further stability to the wing structure.

At the edge of the wing, between the major veins some species have intercalary veins. These veins are typically short and ‘free’ – unattached to other veins. The most commonly known of these intercalary veins are the paired intercalaries found in *Baetis* sp., however other species that have intercalaries include: single intercalary veins in the

Ephemerellidae, Procloeon, Cloeon and Centroptilum; wavy intercalaries between Cu1 and Cu2 in *Siphonurus spp.* and *Ameletus inopinatus*; and two pairs of long intercalaries between Cu1 and Cu2 in the Heptageniidae.

Cross-veins are an important feature of the wing. If you take your piece of paper and push either end of it together, the folds will concertina together until the whole piece of paper folds flat. The cross-veins make sure that the folds remain in position, preventing any concertina effect. They are also useful tools for identification. For example, in *Procloeon bifidum* the cross-veins between the Sub-costa, R1 and R2 all line up. In *Ecydionurus venosus* this is taken a step further with many of the cross veins in the Radial sector lining up. The cross-veins also help to produce the colour and patterning, particularly in the sub-imago. For example the clear 'window' that is found in the mottled wing of the March brown (*Rhithrogena germanica*) is due to an absence of cross-vein in that area of the wing. Similarly, the patterning on the wings of the Brook dun (*Ecydionurus torrentis*) is due to colouring around the cross-veins.

It would be remiss to leave this discussion of wings and veins without mentioning one of the features that separates Ephemeroptera from the other orders of winged insects. At the base of the wing, spanning between the costa, sub-costa and radius is a thick, sturdy cross vein called the 'costal brace'. This feature is unique to the Ephemeroptera and is used in Paleontological studies to recognise early Ephemeroptera in fossils.

Taking the Riverfly training a step further

by Jan Mallik

I have to admit at the outset that I only went along to the Riverfly training day at Hatherleigh, Devon, to see what it was all about, and didn't really intend to get involved. But as the day progressed I became more and more intrigued, and when it came to taking a sample and attempting to identify what we'd caught, I was hooked.

I began with just one site and was amazed at the amount and variety of creatures I caught, and although I concentrated on the ones needed for the survey I soon found I wanted to know more about them – what their life cycles were, and just how many species of olives, mayflies, stoneflies and so on were there? And then I wanted to know what all the other things were that weren't on the Riverfly monitoring guide we were given during the training day?

First I bought a second hand copy of Helen Mellanby's excellent book called *Animal Life in Fresh Water*, which told me all I wanted to know about the life cycles. That was fine, but I found I needed to identify the actual species, and here things got tricky.



Coham Bridge, unnamed tributary of River



Stadson Bridge, Whiteleigh Water; Jan Mallik, 2015

When going through the samples on site I used a better hand lens than the one included in the equipment I'd been given, and I started taking anything that looked interesting home so that I could have a better look at it under the low powered microscope. Luckily I have both a low and a high powered microscope, having studied fungi in the past. With the help of the Collins pocket guide to *Freshwater Life* I was able to identify a few things – Alder and Crane Fly nymphs for example, but I pretty soon got stuck with other things.

First I sent photographs to my immediate Riverfly co-ordinator, who sent a useful list of publications, but couldn't help much with identifying things. So I contacted Ben Fitch, the overall Riverfly co-ordinator, who sprang into action. He recommended specific publications, identified a few things and contacted Craig Macadam of Buglife for help with others, which resulted in an immediate response from Craig with an offer to be my mentor, assisting with identifications and validating specimens when required. I was delighted.

Now I have two official Riverfly sites, and whenever I'm near a watercourse with suitable access I collect a sample to take home to study, and thanks to Craig's encouragement and tremendous knowledge I'm able to satisfy my desire to identify to species virtually everything I find.

Contact us

Ben Fitch, Anglers' Riverfly Monitoring Initiative Coordinator, The Riverfly Partnership, c/o Burgate Manor, Fordingbridge, Hampshire, SP6 1EF

Mobile: 0771 4487 209, Tel: 0117 2303 505, Email: ben@riverflies.org, Skype: amicoordinator

For more information about the Riverfly Partnership and ARMI visit:

www.riverflies.org



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