

PERLA

Annual Newsletter and Bibliography of
The International Society of Plecopterologists



Agnetina capitata (Pictet) (Perlidae), USA: Pennsylvania, Clinton County, Fishing Creek, 10 June 2013. Photograph by Ignac Sivec

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Annual Newsletter and Bibliography of the
International Society of Plecopterologists
Available on Request to the Managing Editor

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PERLA SUBSCRIPTION POLICY

Dues for membership in the International Society of Plecopterologists are \$15 U.S. per year. Members will automatically receive PERLA. Libraries or other institutions may receive PERLA by making a \$10 annual donation, or through an exchange of publications agreement approved by the Managing Editor and Editorial Board. Five dollars (\$5) of the dues will become part of the Scholarship Fund of the Society, to be used for helping active and deserving workers or students participate in future symposia.

Persons or institutions who have no support or are financially unable to pay dues may continue to receive PERLA by writing a brief note to the Managing Editor requesting a waiver of dues and to be retained on the mailing list.


It is therefore important that you respond to this receipt of PERLA 32 (2014) in one of the following ways, in order to be kept on the mailing list for PERLA 33 (2015): (1) pay your annual dues, (2) make a \$10 donation (institutions), or (3) request a waiver. A form and self-addressed envelope are included with this issue, (PERLA 29) for your convenience in responding.

You may send your dues or donation in the form of a personal check, bank note, cashier's check, or postal money order designated in U.S. funds to the Managing Editor. Because of high bank costs for exchange in some countries, you may send cash, in which case the Managing Editor will respond with a personal acknowledgment when received. **NO CREDIT CARD CHARGES CAN BE ACCEPTED.**

Dues and donations are used to help pay the costs of publishing and mailing PERLA, for Lifetime Achievement Award plaques presented by the Society at International Symposia and for the Scholarship Fund. The Managing Editor will make a financial report to the International Committee at each International Symposium Business Meeting or at any other time when requested.

Members or institutions whose dues remain unpaid for two consecutive years, or have not been granted exchange, waiver or emeritus status, will be dropped from the PERLA mailing list.

**ON THE XVII INTERNATIONAL SYMPOSIUM ON PLECOPTERA AND THE
XIII INTERNATIONAL CONFERENCE ON EPHEMEROPTERA**



XIV International Conference on Ephemeroptera

Ephemeroptera

**ABERDEEN
SCOTLAND**

Plecoptera

XVIII International Symposium on Plecoptera

31.5-5.6 2015



**The XIVth International Conference on Ephemeroptera,
The XVIIIth International Symposium on Plecoptera in 2015 in Aberdeen, Scotland**

31 May to 5 June 2015

Plans are well underway for the next Joint meeting of the International Conferences on Ephemeroptera and International Symposia on Plecoptera in June 2015. The meeting will be held in Aberdeen, Scotland's third largest city, which is located on the stunning north east coast between the Rivers Don and Dee. The city has striking granite architecture, an inspiring history, strong industrial heritage, a vibrant population and a thriving art scene. The county of Aberdeenshire has stunning scenery, including Scotland's largest national park – the Cairngorms National Park.

The city has excellent facilities for the Joint Meeting with the Dee and Don catchments and surrounding habitats providing outstanding opportunities for fieldwork. North east Scotland supports a high proportion of the UK Ephemeroptera and Plecoptera fauna, including *Brachyptera putata* – an endemic species with government conservation status.

It is expected that registration for the conference will open in January 2015. Further details will be posted on the conference webpages (<http://www.riverflies.org/international-joint-conference-2015>) as they become available.

Conference venue

The conference will be hosted at the **James Hutton Institute** one of the biggest research centres in the UK and the first of its type in Europe. The scientific programme will be delivered in the Institute's Macaulay suite. Two further rooms will be used as breakout rooms. Lunch and refreshments will be provided for participants during the scientific programme.

Accommodation

The **Hilton Tree Tops Hotel** and **Palm Court Hotel** are both within 15 minutes walk from the conference venue. The **Jury's Inn** is in Aberdeen City Centre (20 minutes by bus) and there are also a number of guest houses in the area that provide bed and breakfast accommodation.

Organizing committee

The organisation and delivery of the Joint Meeting will be overseen by a committee comprised as follows:

Craig Macadam - [Buglife – The Invertebrate Conservation Trust](#) & [Riverfly Recording Schemes](#) Coordinator

Jenni Stockan - **James Hutton Institute**

Michael Dobson - **Freshwater Biological Association**

Bridget Peacock - **Riverfly Partnership**

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TENTH NORTH AMERICAN PLECOPTERA SYMPOSIUM

The Tenth North American Plecoptera Symposium was hosted by **Jane Earle** and **Larry Jackson** at the Lock Haven University's Sieg Center Field Station in southeastern Clinton County, Pennsylvania, U.S.A. Jane and Larry were wonderful hosts and made the meeting a very enjoyable event. Fishing Creek, a beautiful and well-known trophy trout stream was only a few meters from the meeting hall. At least fourteen species of stoneflies were collected by participants during the meeting. The accompanying photographs were graciously provided by Drs. Riley Nelson and Ignac Sivec.

10th North American Plecoptera Symposium

June 8-11, 2013

Facility Provided by the Department of Biological Sciences, Lock Haven University
Additional Sponsorship by the Entomological Society of Pennsylvania

Day 1 Saturday June 8

- 2-5 pm – Arrival, registration; snacks & beverages
- 5- 8 pm or arrival– Registration, Dinner: sandwiches, salads, cheese & crackers, beverages, etc.
- Walk, rest, mingle, fish, insect collecting etc. Maps will be available

Day 2 Sunday June 9

- 7:15 am- 8:30 am Breakfast
- 8:30 am- 9 am Registration and Introductions

PROGRAM

SESSION 1

- 9 am WELCOME TO PENNSYLVANIA
Jane Earle, Research Associate, Academy of Natural Sciences of Drexel University
- 9:20 am CAPNIIDAE OF PENNSYLVANIA
Jane Earle, Research Associate, Academy of Natural Sciences of Drexel University
- 9:45 am THE DISTRIBUTION AND DIVERSITY OF STONEFLIES (PLECOPTERA) IN NEW YORK STATE.
L. W. Myers, Lake Champlain Research Institute, B. C. Kondratieff, Colorado State University, T. B. Mihuc, Lake Champlain Research Institute.
- 10:05 – 10:30 am BREAK
- 10:30 am OPEN ACCESS POLICY AND STONEFLY JOURNAL ILLIESIA
Ignac Sivec, Slovenian Museum of Natural History, Presernova 20, 1000 Ljubljana, Slovenia. Bill P. Stark, Department of Biology, Mississippi College.
- 10:55 am NUMBERS: QUANTITATIVE INSIGHTS FROM A STONEFLY SURVEY
Andrew L. Sheldon, University of Montana, and Scott A. Grubbs, Western Kentucky University
- 12 noon to 1:30 pm LUNCH

SESSION 2

- 1:30 pm NOTES ON LARVAL AND EGG MORPHOLOGY OF *PARAPERLA FRONTALIS* (BANKS) AND *P. WILSONI* RICKER (PLECOPTERA: CHLOROPERLIDAE).
Bill P. Stark, Mississippi College; Richard W. Baumann, Monte L. Bean Life Science Museum, Brigham Young University; Boris C. Kondratieff, Colorado State University and Kenneth W. Stewart, University of North Texas.
- 1:55 pm THE FREQUENCY DISTRIBUTIONS OF VARIOUSLY SIZED EXTANT GENERA AND VARIOUSLY SIZED EXTANT FAMILIES IN PLECOPTERA CLASSIFICATION
Charles H. Nelson, Department of Biological and Environmental Sciences, The University of Tennessee at Chattanooga.
- 2:20 – 2:45 pm Break
- 2:45 pm DISTRIBUTIONAL ECOLOGY OF *BELONEURIA JAMESAE*, A “RARE” ALABAMA STONEFLY.
Andrew L. Sheldon, University of Montana, and Scott A. Grubbs, Western Kentucky University.
- 3:05 pm PLECOPTERA OF MONGOLIA
C. Riley Nelson, Department of Biology, Brigham Young University; Sarah Judson, Department of Watershed Sciences, Logan, Utah; Jon K. Gelhaus, Department of Entomology, Academy of Natural Sciences of Drexel University.
- 3:45 – 5:30 pm Local collecting, socializing, relaxing
- 6:00 pm dinner – Banquet
- 7:30 pm Remembrance of Dr. Ken Stewart:
Bring your photos, PowerPoint slides, stories, etc. to honor Dr. Ken Stewart
- Later, night insect collecting.
- Day 3 – Monday June 10
- 7:15 – 8:15 am Breakfast

SESSION 3

- 8:30 am WESTERN NORTH AMERICAN LEUCTRIDAE GENERA (PLECOPTERA), A SCANNING ELECTRON MICROSCOPY STUDY
Audrey B. Harrison-Lewis, Redwood, MS; and Bill P. Stark, Mississippi College.

- 8:55 am A REVIEW OF THE NEARCTIC GENUS *ZEALUUCTRA* RICKER (PLECOPTERA: LEUCTRIDAE), WITH THE DESCRIPTION OF A NEW SPECIES FROM THE CUMBERLAND PLATEAU REGION OF EASTERN NORTH AMERICA
Scott A. Grubbs, Western Kentucky University; Boris C. Kondratieff, Colorado State University; Bill P. Stark, Mississippi College; R. Edward DeWalt, Illinois Natural History Survey
- 9:20 am THE STONEFLY FAUNA OF THE TALLADEGA MOUNTAINS
Scott A. Grubbs, Western Kentucky University, and Andrew L. Sheldon, University of Montana.
- 9:45 am PRE-EUROPEAN SETTLEMENT RANGE PREDICTIONS FOR STONEFLIES (PLECOPTERA) OF THE MIDWEST
Dewalt, R. E.¹, Cao, Y.¹, Robinson, J.L.¹, Grubbs, S.A.², Tweddale, T.¹ and Hinz, L.¹, ¹Illinois Natural History Survey; ²Western Kentucky University
- 10:30 am – 5:30 pm Field trip insect collecting, visit to an acid treatment system
Pack sack lunch & beverages
- 6:00 pm Barbecue Dinner
- 7:30++ Microscope use, short presentations, mingle, &/or night insect collecting

Day 4 – Tuesday June 11

- 7:00 am Breakfast
- 8:30 – 11 Session 4, taxonomy fair, research discussions, future issues, etc.



*10th North American Plecoptera Symposium, June 8-11, 2013, Seig Center,
Lamar, PA*



***Leuctra* sp. (Leuctridae) USA: Pennsylvania, Clinton County, Fishing Creek, 10 June 2013.
Photograph by Ignac Sivec**









Dr. Bill Stark, always looking for the next stonefly!

ELEVENTH NORTH AMERICAN PLECOPTERA SYMPOSIUM will be organized by Drs. C. Riley Nelson and Boris C. Kondratieff either in Colorado or Utah for summer of 2016.

ILLIESIA

Illiesia, International Journal of Stonefly Research, completed publication of Volume 9 in December 2013. Twelve articles submitted by 19 authors based on material from the Palearctic, Oriental, Nearctic, Neotropical, and Patagonian regions were included in the 125 pages of this volume. *Illiesia* continues to offer rigorous peer review under direction of the the Advisory Board and Editors, with assistance of colleagues who agree to review manuscripts. Editors are Ignac Sivec, Slovenian Museum of Natural History and Bill P. Stark, Mississippi College. The Advisory Board for 2013 included **Boris Kondratieff, Richard Baumann, Stan Szczytko, C. Riley Nelson, Charles H. Nelson, John Brittain, Takao Shimizu, Claudio Froehlich, Wolfram Graf** and **Peter Harper**, and journal formatting is under the direction of Mia Sivec and Mojmir Stangelj. We thank you for your continued support and invite your submissions for Volume 10. Questions or submissions may be sent to isivec@mrc.pms-lj.si or stark@mc.edu. The *Illiesia* website is located at <http://www2.pms-lj.si/illiesia/>.

OBITUARY



John F. Hanson 1915 - 2013

John F. Hanson passed away on September 15, 2013 in Traverse City, Michigan. A daughter, son-in-law and loving care-givers were by his side. John was born on April 25, 1915 in Medford, Massachusetts to Nils Johan and Alma Maria Hanson. He received his B. S. (1937), M. S. (1938), and Ph. D. (1943) degrees from the University of Massachusetts, Amherst majoring in entomology. He was a student of both the prolific insect taxonomist Charles Paul Alexander and the distinguished insect morphologist Guy Chester Crampton, and specialized in the morphology and systematics of the insect order Plecoptera or stoneflies. In actuality, however, he had two parallel but somewhat different careers. His older brother, an MIT engineering graduate, and an employee with Raytheon Manufacturing Company in Waltham, Massachusetts got him involved with the company. Prior to the second world war John worked at Raytheon during the summers to help with the expenses of raising a family. During the last three years of the war he worked full-time as a Magnitron production engineer. Although not formally trained as an engineer, his ability to examine problems from many different perspectives led to saving Raytheon production time, space as well as millions of dollars in costs. These efforts led him to being named in 1946 as a magnetron development engineer and in that capacity he invented and developed the cermet cathode which was central to the operation of the high-wattage magnetron that served the radar network of that time. The magnetron is also the heart of the “Radarange” or microwave oven and its inventor at Raytheon, Percy Spencer, when he retired recognized John’s contributions by presenting him with his personal office desk. After leaving full-time employment at Raytheon, John continued to work for them as a consultant and in this role conducted critical surveys and

technical analyses of certain nonproductive research divisions and made suggestions for corrective measures and administrative changes.

Later, John and his wife Marie founded and operated the Ace Filament Company which for more than two decades provided engineering consulting, inventing, and manufacturing services for Indelco, Ceramic Coating Incorporated, Optical Micro Systems, Tesla Engineering and Raytheon. One of the company's tungsten projects was used in the space program and now sits on the moon. In 1991, more than ten years after he retired from his engineering and academic pursuits, Raytheon invited John back for ceremonies surrounding the visit of President George H. W. Bush.

However, the study of stoneflies remained his first calling. While still a graduate student his first paper, "*Studies on the Plecoptera of North America I*" was published. And in 1945 he was a successful recipient of a Guggenheim Memorial Foundation Fellowship for the study of this insect group. His published doctoral dissertation the "*Comparative Morphology and Taxonomy of the Capniidae (Plecoptera)*" stands as an authoritative contribution to the phylogenetic and taxonomic relationships of the genera within this family. In 1947 he returned to the University of Massachusetts as assistant professor and ultimately advanced to full professor. There, 'Doc' as he was affectionately known, taught courses in evolution, insect morphology, taxonomy, and forest entomology. His teaching was punctuated with his expertise in genetics, physics and his advocacy of evolution as a universal operational principle that underlies and connects both the inorganic and organic realms. Generations of students will recall learning of the acronym HUSP – Hanson's Universal Principle of Progress. In the classroom John had a knack of simplifying complex concepts through visually insightful examples. Students in his insect morphology course working late at night in the laboratory found it common for John to drop by to see if they needed assistance. He was approachable both in and outside the classroom. His door was always open and in his office one could always find his classroom or thesis students discussing evolutionary, entomological or other topics of interest. During this time, aided by grants from Sigma Xi and the National Institutes of Health, he published a number of papers on stoneflies. These studies were based on numerous field-collecting trips in eastern and western North America. The line drawings that accompanied each paper were always skillfully and carefully crafted to depict the diagnostic characters that readily distinguished the relevant taxonomic groups. Several papers reflected his interest in thoracic sternal plate morphology and what it could inform about stonefly relationships. Occasionally his engineering proclivities would show up and articles appeared on such diverse topics as improving and accelerating KOH clearing of specimens, a foot-focusing device for the stereomicroscope, a dripless dispensing bottle, and trays for filing and storing liquid preserved specimens. He co-authored a bibliography of stonefly papers to supplement the earlier published Claassen catalog and authored a bibliography of entomology papers published by the entomology department through 1955 for department's annual yearbook. Many of his research papers appeared in the *Bulletin of the Brooklyn Entomological Society* where he served for a number of years as editor. Upon his retirement from the university in 1980, John's Plecoptera collection with its types and many thousands of specimens was provided to the United States Museum of Natural History at the Smithsonian Institution. The species patronym *Isogenoides hansonii* and the generic patronym *Hansonoperla* also honor his contributions. In 2011, at the age of

96, he was named as a recipient of the Lifetime Achievement Award by the International Society of Plecopterists.

When not working in either of his laboratories, John's passion was collecting and discovering new stonefly taxa as well as skiing, camping, gardening, traveling, and hiking in the mountains with his family. He was an avid participant in sports and organized and played on the entomology department's intramural softball and volleyball teams. He often found himself playing with as well as outplaying graduate and undergraduate students some twenty years his junior. John also loved the game of tennis and could be found on the courts until he was ninety. Another pastime he greatly enjoyed was collecting and refurbishing antique cars and he frequently could be found attending meetings and shows with fellow old car enthusiasts.

John as a person was direct and honest. He had a great sense of humor and throughout his life appreciated a clever joke. Moreover, he was warm-hearted and generous with his enthusiasm, encouragement, and support to family, friends, and his students. He held high expectations for himself and others. A goal-centered individual, John in retirement continued to work on various engineering-related projects as well as a book about his views concerning a universal system of evolutionary progress. When John was a very young man he wrote the following life objectives in his diary: "*To do everything as best I can; to teach college; to travel and collect insects; to be active in sports; to live 100 years in perfect health.*" It is a tribute to his drive, energy, and love of life that he accomplished the first four of these, and just barely missed the last one, written when life expectancy was approximately 62 years, by a mere nineteen months. John was predeceased by Marie - his wife and partner of 72 years, a daughter Marie Saunders, a brother Per Roland Hanson, a sister Lillian Bartlett and a granddaughter Erika Pankow. He is survived and missed deeply by daughters Trina (Joe) Ball, Patricia (Harry) Joiner, Phyllis (Bernd) Pankow, seven grandchildren, thirteen great-grandchildren and numerous nephews, nieces, colleagues, students, and loyal friends.

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MEMBERS NEWS

Two Master's Theses on Norwegian stoneflies Scanned

Louis Boumans, Natural History Museum, University of Oslo

Shortly before his death, **Albert Lillehammer** (1930-1993) supervised two master's theses on Norwegian stoneflies. **Torfinn Ørmen** (1991) performed an in-depth comparative study of three populations of *Leuctra hippopus* from Norway. The study includes morphometry, enzyme electrophoresis and behavioural observations, notably

recordings of the male call. The chapter on behaviour includes an oscillogram of the call of *L. hippopus* Kempny from Germany, provided by **Prof. R. Rupprecht. Erik Clevén** (s.a. [1992]) documents vibrational communication for no fewer than ten Norwegian species; recording attempts with four additional species were unsuccessful. Relatively few drumming signals of European stoneflies have been published, so that Ørmen's and Clevén's work constitutes an important addition.

In consultation with the authors, we scanned these typewritten theses to make them more easily accessible. Links to the pdf files will eventually appear on <http://plecoptera.speciesfile.org/>. For the time being, the theses can be downloaded from this link: http://radon.uio.no/http/Louis/scanned_ms_theses/

References

Clevén E. s.a. [1992]. The drumming of Norwegian Stoneflies (Plecoptera). University of Oslo, Oslo, Norway.

Ørmen T. 1991. *Leuctra hippopus* Kempny, 1899 (Plecoptera: Leuctridae): studies on a species problem, with notes on related species. University of Oslo, Oslo, Norway.

ANNOUNCEMENTS

Hello Everyone:I was looking through the archives at the University of Wisconsin and came across a file folder with color photos of the XI International Plecoptera Symposium at Treehaven, Wisconsin (see Perla No. 11 1193) in 1992 taken by the university photographer. I have scanned them and placed them on a server here so you can access them and download as many as you like. The http address is <http://cnrfiles.uwsp.edu/szczytko/> Looking at these photos is bitter sweet since so many that were at the meeting are no longer with us. I was a bit rushed in getting them posted while here on campus so I was not able to label all of them. Enjoy!!

Cheers!

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Klapperich's Chinese Plecoptera, and some Plecoptera types in Museum Koenig, Bonn, Germany

Peter Zwick, Schlitz, Germany

Johann Friedrich Klapperich was an entomologist working mainly on Coleoptera (Roer 1987). In 1937, he went to Fukien, China for two years to collect insects for the Museum Koenig at Bonn. That his large collections contain also Plecoptera was not known. In 1966, while working with the Diptera: Blephariceridae of the late B. Mannheims, I was handed as a loan for study 3 wooden boxes (ca 35 x 25 cm) with pinned stoneflies collected by Klapperich in Fukien (Fujian, People's Republic of China), mostly large Perlidae.

This collection was kept in the Limnologische Flussstation Schlitz for many years. The late Joachim Illies identified a few *Styloperla inae* Chao. *Nemoura klapperichi* Sivec, 1981, was named from this collection, the holotype remains in it. During his repeated visits to the Schlitz institute, Ignac Sivec prepared genital preparations of most of Klapperich's specimens. They were numbered and Ignac referred to these numbers in his many notes (in Slovenian) and excellent pencil drawings, mainly of genitalia and eggs, on numerous DIN A5 pages. The documents were photographed before Ignac returned home. When the Limnologische Flussstation Schlitz was closed early in 2007 I took Klapperich's collection to my home, hoping that Ignac would complete its study by a list of names or name labels. Ignac now tells me that he is at it and tries to complete his study.

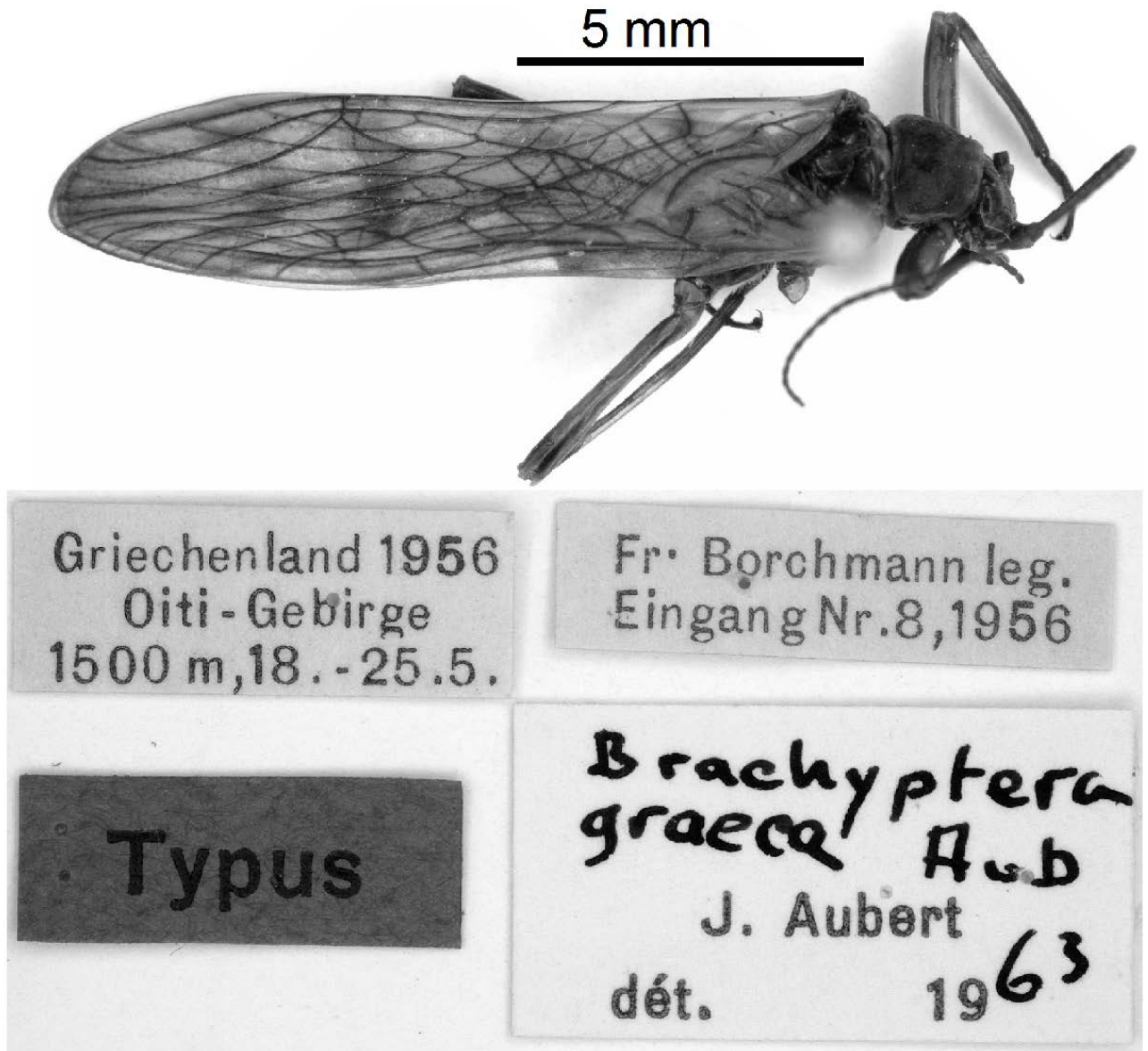
To ensure proper curation and continued availability of this material, the collection was returned to Museum Koenig in April, 2013, together with a specimen list, the beforementioned photographs and digital copies thereof. A few more Perlidae collected by Klapperich in Fukien turned up in a mixed stonefly collection that I was sent three years ago. It was now also returned to Museum Koenig. The Chinese Perlidae in this last collection remains unstudied. Most other specimens are common German species, mainly from North Rhine Westphalia.

Also included in this recently obtained collection was the holotype male of *Brachyptera graeca* Berthélemy, 1971. The late J. Aubert had labelled this male as type of *Brachyptera graeca* Aubert, 1963 (Figure 1). Some females were labelled as allo- and paratypes, respectively. However, that name was never published. Instead, Aubert (1963) published a description and excellent genitalia figures of these specimens as a redescription of *Brachyptera beali* (Navás, 1924).

The holotype of *B. beali* eventually proved to be a different species (Berthélemy 1971). Berthélemy therefore designated the male in Museum Koenig studied and illustrated by J. Aubert as holotype of a new species, incidently using the same name as the unpublished one on Aubert's labels, naming *B. graeca* Berthélemy, 1971. Berthélemy did not mention

the females which therefore have no type status. He erroneously stated that Aubert had labelled the specimen as “holotype” of *B. beali* and suspected this had happened in error, instead of “neotype”. Apparently, Berthélemy never saw the actual specimen. Probably, the above confusion has resulted from some error or misunderstanding in correspondence between C. Berthélemy and J. Aubert.

Regardless the description of *B. graeca* Berthélemy, 1971 is valid, the name is available (ICZN, article 13.1.2), and the holotype is in Museum Koenig, Bonn.



Literature Cited

- Aubert, J. 1963. Quelques Plécoptères de Grèce. *Bonner Zoologische Beitrage* 14 (3/4): 224-227.
- Berthélemy, C. 1971. Plécoptères de Grèce centrale et d' Eubée. *Biologia Gallo-Hellenica*. 3 [1970] (1): 23-56
- ICZN (1999) International Commission on Zoological Nomenclature International Code of Zoological Nomenclature online. <http://www.nhm.ac.uk/hosted-sites/iczn/code/>; last accessed 14.06.2013
- Roer, H. 1987. Johann Friedrich Klapperich (1913-1987). *Bonner zoologische Beitrage* 38: 147-148.

A First Look at Regional Changes in Stonefly (Plecoptera) Assemblages under Climate Change

R. Edward DeWalt, Yong Cao, Jason L. Robinson, Tari Tweddale, and Leon Hinz
Illinois Natural History Survey, 1816 S Oak St., Champaign, IL 61820,
dewalt@illinois.edu, 217-649-7414; yongcao@illinois.edu, 217-244-6847

Many of you know that my colleagues and I have been modeling distributions of stoneflies within the middle USA. We have a good approximation of pre-European settlement distributions for 78 of 146 species known from Illinois, Indiana, Michigan, Ohio, and Wisconsin at USA Geological Survey watershed scale HUC12 (avg. 200 km²). This sets the base distribution for stoneflies in the region. Summing modeled species within a drainage yields a pattern of species richness (Fig. 1). The richest areas are those that are unglaciated (southern third) and heavily forested. The first major product from this work is Cao et al. (2013) for Illinois. This year we will publish the regional model and its validation.

We are also examining how climate change will influence species ranges and the pattern of species richness across the area using downscaled climate data from nine climate models and two emissions scenarios throughout the 21st century. As an example of how climate change scientists think climate in the middle USA will change, the shift in heat index (how hot it feels) is presented for both Illinois and Wisconsin (Fig. 2). Even with low emissions (in orange) it will feel much hotter by the end of the century. High emissions (red) are predicted to lead to drastic changes.

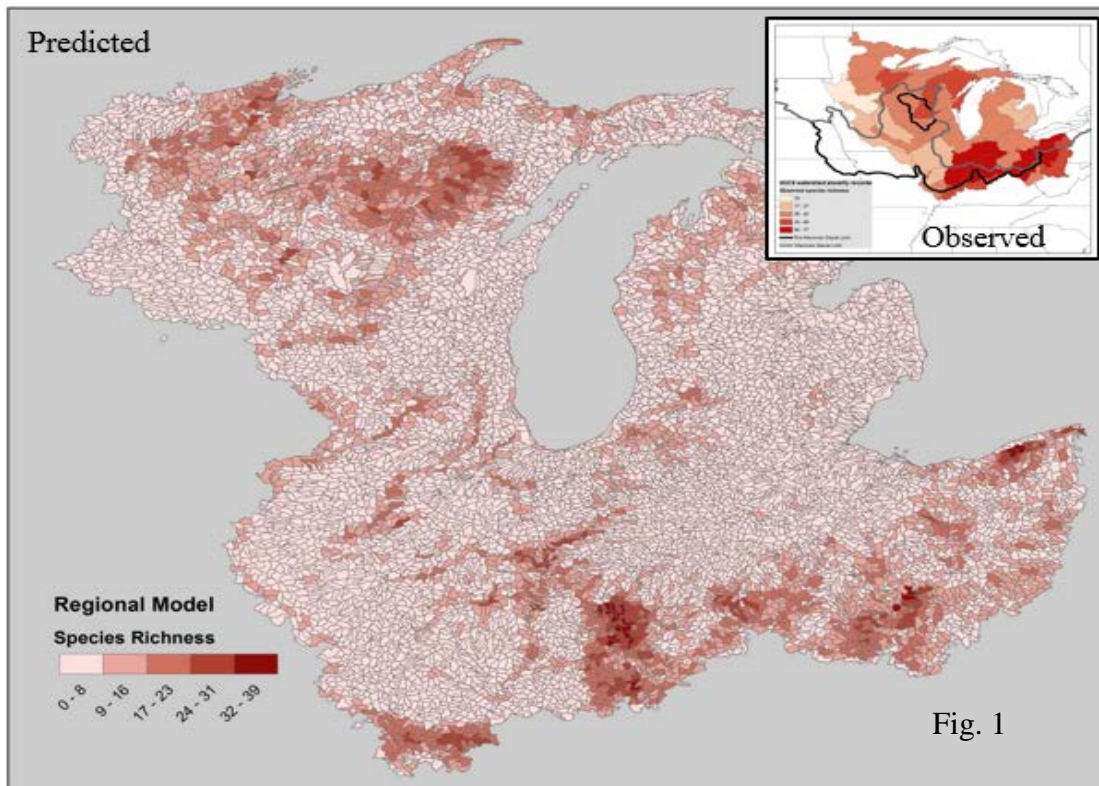
Nearly 100 physical variables plus specimen data were used in Maxent software to create the pre-settlement maps. Each of these variables (forest cover, slope, surficial deposits, etc.) might have some ameliorative effect upon changing temperature and rainfall patterns. However, running the climate change models with all these variables is very time consuming, so at this point we have ran the models with climate alone, trying

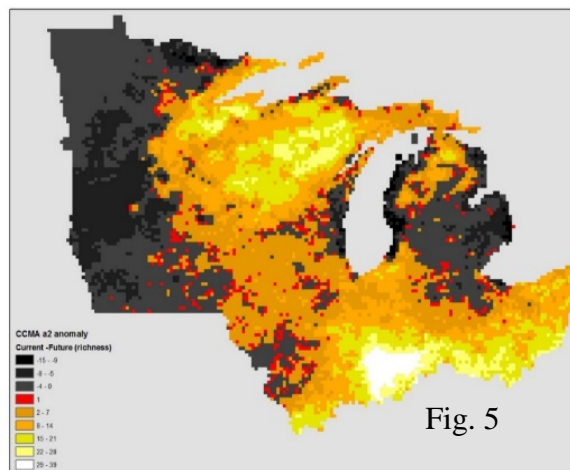
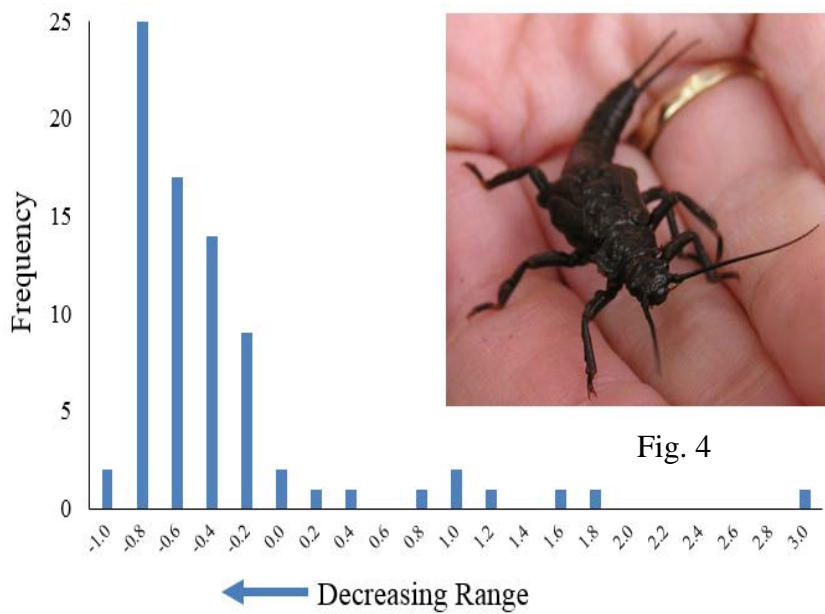
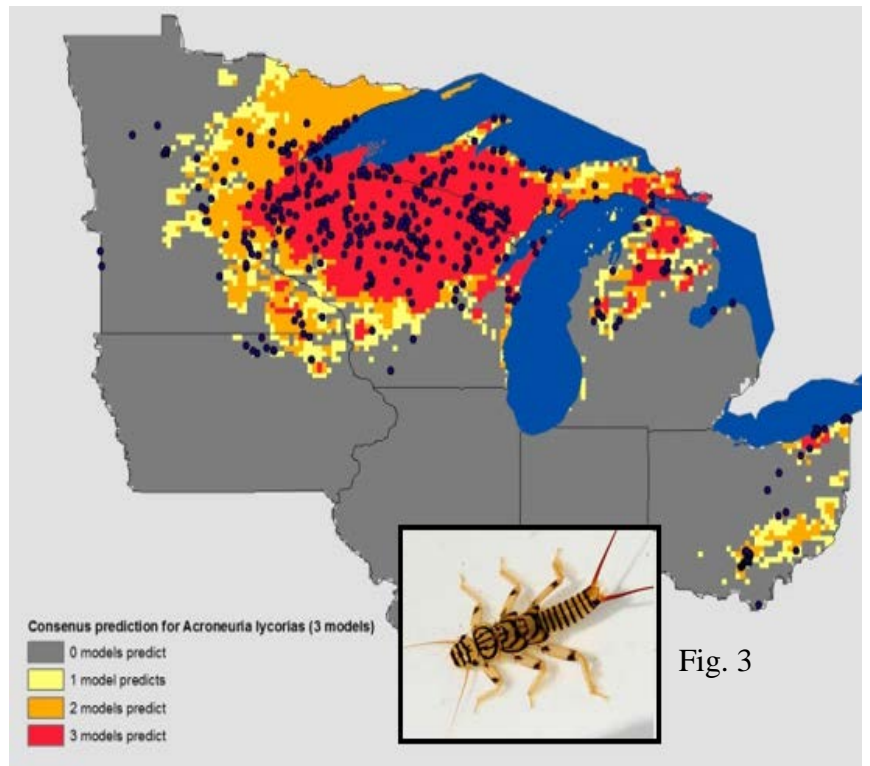
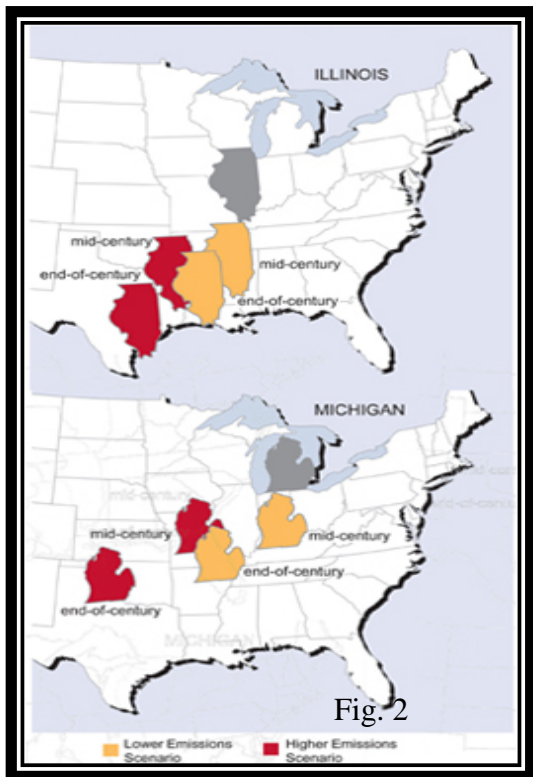
to predict how the climate space of each stonefly species and the overall richness pattern might change throughout the 20th century. You will notice that we have added specimen data from Iowa and Minnesota.

Consensus current distributions derived from three climate models produced maps for each of 78 species (Fig. 3). Results were compared for these current consensus models to those future models for two climate models and high and moderate emission scenarios. For brevity, the worst case scenario is presented. It is predicted that the vast majority of the 78 modeled species will dramatically lose range (Fig. 4). Alternatively, some species will gain range, potentially *Attaneuria ruralis* Hagen is one of these. All families except Perlidae are expected to lose range within the middle USA (not figured). The pattern of species richness is also expected to shift, with many areas predicted to undergo dramatic losses of richness. Areas in Fig. 5 that have the brightest color are predicted to lose the greatest number of species. We are in the process of adding the physical variables to our predictions of the future. We hope that we see an amelioration of the effects of climate alone, otherwise, the Plecoptera assemblage of the middle USA is expected to change dramatically. Mayfly and caddisfly data will be added this summer too.

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Cao, Y., R. E. DeWalt, J. L. Robinson, T. Tweddale, L. Hinz, and M. Pessino. 2013. Using Maxent to model the historic distributions of stonefly species in Illinois streams and rivers: the effects of regularization and threshold selections. *Ecological Modelling*, 259: 30–39. <http://dx.doi.org/10.1016/j.ecolmodel.2013.03.012>.





RECENT PLECOPTERA LITERATURE (CALENDAR YEAR 2013 AND EARLIER). Papers made available after 1 February 2014 will be included in the next issue. **If papers were missed, please bring these to the attention of the Managing Editor.** Drs. Bill P. Stark, J. M. Tierno de Figueroa, and Peter Zwick are thanked for reviewing and providing additions to this present list.

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Tallaperla maria (Needham & Smith) (Peltoperlidae), USA: Pennsylvania, Clinton County, Fishing Creek, 10 June 2013. Photograph by Ignac Sivec