

Plecopterologists and those interested are invited to visit the museum and tour the collection facility. Since, the North American stonefly meeting will be held in Provo in 2016, this is an ideal time to see the collection.

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## World Capniidae Studies

Dear Colleagues:

This year we are about to finish a generic revision of the World Capniidae and a species level revision of the Japanese Capniidae. I will stay in Japan until December 2016 as a Postdoctorate Fellow supported by the Japan Society for the Promotion of Science working with **Maribet Gamboa** and **Kozo Watanabe**, Ehime University. The generic revision will be based on holomorphology and COI sequences. We plan submit a multi-authored Zootaxa monography. We will not resolve the complete phylogeny of the family but we will be able to define the genera using both approaches. Of course, autapomorphies will be also defined using comparative morphology. The revision of the Japanese species will be based on morphology, COI, and bioacoustics. We plan to submit this work also as a Zootaxa monograph, being published shortly after the generic revision. Since last December, I have been informing many of you about the progress through regular e-mails updates. If you have not received my progress reports but are interested in joining the project, or simply would like to follow our progress, please contact me at [d.muranyi@gmail.com](mailto:d.muranyi@gmail.com) and I will add you to the list. It is my hope that these two future monographs will be realized with the cooperation of the stonefly research community.

**Dávid Murányi**

<b>ARTICLES</b>
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### **Progress on Digitization of the Kenneth Wilson Stewart Plecoptera Collections at the Illinois Natural History Survey**

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**Introduction.** Kenneth Wilson Stewart, just prior to his death in December of 2012, made arrangements for his Plecoptera collection to be shared by two institutions: the Illinois Natural History Survey (INHS) at the University of Illinois and the Monte L. Bean Museum at Brigham Young University (BYU). Eastern specimens (Great Plains and east) went to the INHS under the care of R. Edward DeWalt, and the western material went to BYU under the care of Richard (Dick) W. Baumann. The eastern material amounted to 3,800 vials of specimens, two field notebooks, original and replicate illustrations, and many reprints. A tally for BYU specimens is not yet available, but it is at least as large as the INHS share.

Dick, Shawn Clark (BYU Insect Collection Manager), and I met in February 2013 in Denton, Texas. We visited with Francine Stewart and the loss of Ken was still very difficult for her. She spent a lot of time reminiscing with photographs and other mementos that we brought out of the laboratory for her. We all shared a nice evening with her and her family one evening.

The packing and sorting of Ken's accumulated life's work took two and a half days. About half of the material was well organized in wooden cabinets. The rest was stowed away in dozens of boxes or racks by project (e.g., Texas stoneflies), several of which were in progress at the time of Ken's death. In addition, there was much borrowed material, care being taken to keep those vials together for eventual return to their home institutions. I left for home with a heavy heart and pickup truck full of important specimens and supporting documents—a large proportion of Ken's life work.

**A Profile of the Collection.** In Champaign, Illinois, RED reorganized Ken's collection by taxon into numbered INHS racks and then profiled the condition of the specimens (Favret et al. 2007). Profiling provides numerical benchmarks of current condition and future improvement after additional curation. *Identification* among most specimens was to genus or species. *Locality labels* were a mixed bag. While they were usually precise enough to georeference, many photocopied labels were in danger of losing their type entirely. About 20% of locality labels consisted of either codes or incomplete location data. Most of these labels originated from two projects: Poulton & Stewart (1991) in Arkansas, Missouri, and Oklahoma; and Stark & Stewart (1973) for Oklahoma work. The Poulton key codes and the Stark field notebook for 1971-72 were found in Ken's laboratory and they have been digitized and georeferenced. A publication later this year (probably Biodiversity Data Journal) will provide access to all these locations—anyone with specimens from these projects will be able to obtain full label data for them.

*Storage containers* ranged from 2 dram snap caps to eight dram screwcaps, but most specimens were housed in 3 dram, patent lip vials with old, dried out or swollen stoppers (Fig. 1). *Preservative* levels were often low and fluids discolored. The entire collection would have to be unified into one storage type. Due to the inability to find high quality stoppers, we have opted to move all material into 4-dram glass, screw top vials and screwcaps with beveled polypropylene liners. Fluids will need to be replaced with one or more rinses of 75% EtOH to remove the variety of original preservatives used (denatured EtOH, isopropanol, Kahle's fluid, and some fluids with sticky residues). It is readily apparent that part of this collection was in danger of being lost due to its poor condition.

**Authors Receive Grant to Accession Collection.** The authors recently obtained a USA National Science Foundation grant to accession some 80,000 vials of donated material from Stewart, Stanley W. Szczytko, Brian J. Armitage (Ohio Biological Survey specimens and others), and several other collections. We will also be moving wet insect types to refrigerated storage and imaging types and their labels. Work began in September 2015 and will last through August 2018. Not only will all specimens be accessioned, but their identities and event data will be digitized and shared through the INHS website and with the Global Biodiversity Informatics Facility in Copenhagen, Denmark. A master's student will examine repeated patterns of distribution of stoneflies in the east and look at factors promoting these distributions. Undergraduate summer interns will be trained in museum work and systematics as well.

**Planning and Implementation.** We wanted to do the following with specimens and labels for thousands of specimens: rinse out old preservatives, move to new storage, and image specimens and labels. How do we do all this and minimize damage due to handling? We needed a procedure that gave us industrial efficiency, but was gentle enough to protect the specimens and labels. We also envisioned a protocol that was composed of stages that could be interrupted at the end of each stage. After several failed workflows, we settled on a process where vial contents are handled only twice: removal from old and placement in new storage, with photography between. We also wanted to time each stage and record conditions that increased handling time. There were three phases of the work: Pre-image processing, Imaging, Post-image processing.

*Pre-image.* This involved work on specimens in their previously profiled and numbered racks. First, all caps and stoppers were removed from up to 100 vials at a time. The racks were then tilted to dribble out old fluids (saved as for disposal as chemical waste) and 75% EtOH added as rinse. Enough small, plastic petri dishes were assembled onto cafeteria trays (Fig. 2) to match the number of vials in a rack, the contents of each vial was moved to the dishes and covered. Unique catalog numbers were cut and placed in sequence on the petri lids.

*Imaging.* A jig used in photography was constructed from two layers black plastic sheeting (Fig. 3). It includes a well for the petri dish of specimens and red tape that defined quadrants for the catalog number, collecting event, determination label, and other labels. A label with metadata with the project name, date, and person imaging was also provided. Images were taken with natural light in a well-lit room and replaced on the tray. All images for a given set of metadata were downloaded from the camera immediately after imaging, saved to a folder on the laboratory computer, and then copied to Dropbox for ease of sharing with project personnel.

*Post-imaging.* The order of vials in the original racks was reconstructed from the sequential catalog numbers. All new vials needed were placed into original racks and filled with 75% EtOH (Fig. 4). Labels were transferred to vials to fit its long axis. Specimens were gently moved to the vials and the catalog number fit inside the top of the vial so that they could be easily seen.

**TaxonWorks, a New Data Management System.** My co-PIs have written software that recognizes the quadrants of the jig and conducts Optical Character Recognition (OCR) on the text, placing the text into editable text boxes (Fig. 5). Of course, OCR often works for printed text with some editing nearly always necessary. Most important is to capture the catalog number accurately. Matt Yoder is currently adding in pick lists for state, county, stream, and taxon names (Fig. 6). Once these are added to a digital record, sorting and rapid normalization of the rest of the data will follow.

**Time in a Bottle.** With data from processing of 1509 vials, we found that it takes just under three minutes per vial to complete all three phases (Fig. 7). It turns out that putting specimens back into the 4-dram vials is the most time consuming, the actual photography takes the least amount of time.

Some problems that add time to processing specimens are relegated to only one stage, or plague staff throughout the process. Swollen stoppers are a problem only during the Pre-imaging stage. All vials where stoppers did not come out easily were set aside until all racks for a given set were worked through. We then wrapped a vial with a failed stopper in paper toweling and

broke the vial with pliers to remove its contents. An example where time was lost throughout the process involved over-sized labels that were longer than the vials and especially those that are coiled within a vial. These had to be unwound and gently pulled out of the vial. Sometimes, these had to be folded to fit in the petri dishes. They often required trimming to get them into the new vials. We understand why labels are coiled, but the oversized label make little sense. Event labels are often coiled at the top of the vial to help a curator to organize collections by state and county. Once a catalog number has been added to a vial, coiling labels is not necessary, and frankly undesirable. Of course, those donating materials do not often realize that how they organize specimens really affects those of us who are trying to save their work for posterity. In the digital age when specimen data must be electronically available, we all need to re-evaluate how we label specimens.

Most of Ken's material has now been imaged and we have started working on the Szczytko material as of late January, 2016. Stan's material will be finished by the end of March and data from these collections will become available by the end of the year. The work presented here may seem a bit esoteric, but it will help to preserve the accumulated works of two of the most prominent Plecoptera researchers in recent history. This method may also be useful for collaborative purposes since the software that is managing the effort, TaxonWorks, is fully internet based.

Favret, C., K. W. Cummings, R. J. McGinley, E. J. Heskey, K. P. Johnson, C. A. Phillips, L. R. Phillippe, M. E. Retzer, C. A. Taylor, and M. J. Wetzel. Profiling natural history collections: a method for quantitative and comparative health assessment. *Collection Forum* 22:53-65.

Poulton, B.C. & Kenneth W. Stewart. 1991. The stoneflies of the Ozark and Ouachita Mountains (Plecoptera). *Memoirs of the American Entomological Society*. 38:1-116.

Stark, Bill P. & Kenneth W. Stewart. 1973. New species and descriptions of stoneflies (Plecoptera) from Oklahoma. *Entomological News*. 84(6):192-197.



Fig. 1. Range of storage typical of the K. W. Stewart Collection.



Fig. 2. Specimens and labels from rack placed in petri dishes on cafeteria tray, catalog numbers atop.

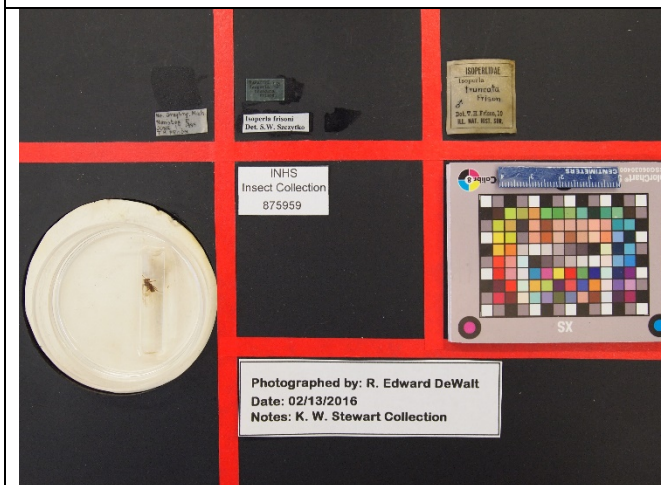


Fig. 3. Photographic jig for imaging labels and specimens. Quadrants for specimens, several types of labels, catalog number, and metadata.



Fig. 4. Final product: specimens and labels moved to 4 dram glass vials with polypropylene beveled insert in screw cap.

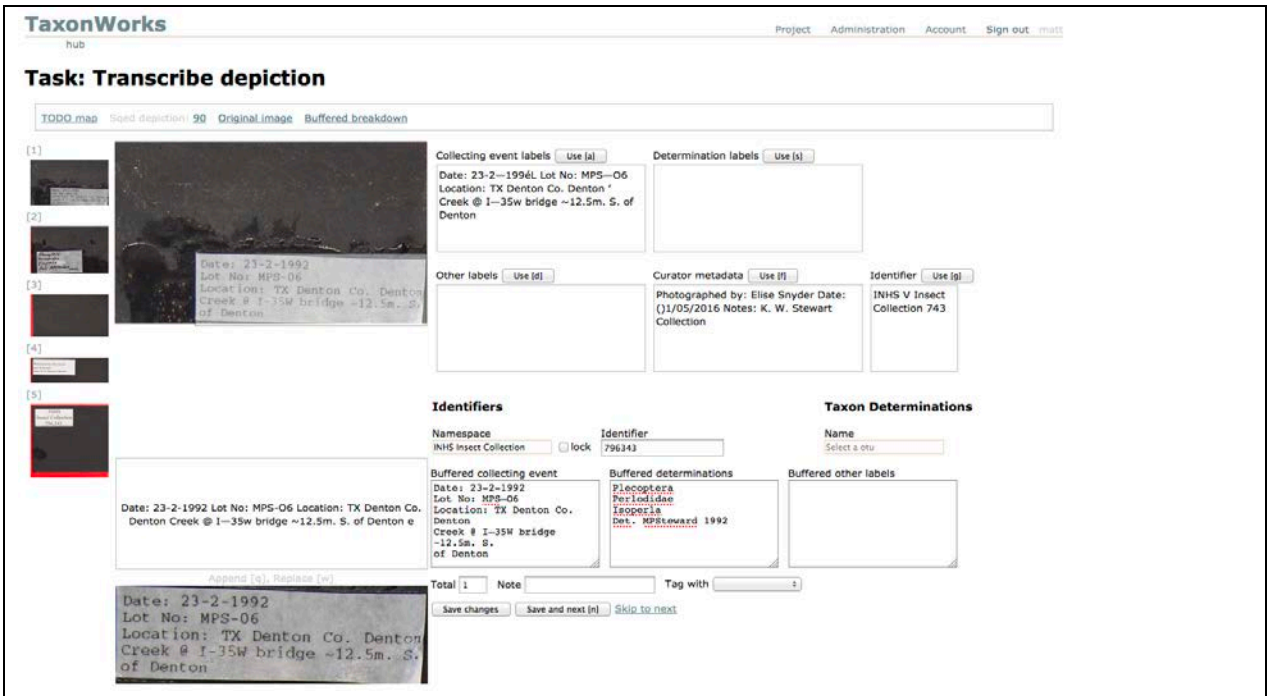


Fig. 5. TaxonWorks having pulled separate images from quadrants and OCR'd them. Continue refining of label data may take place as needed.

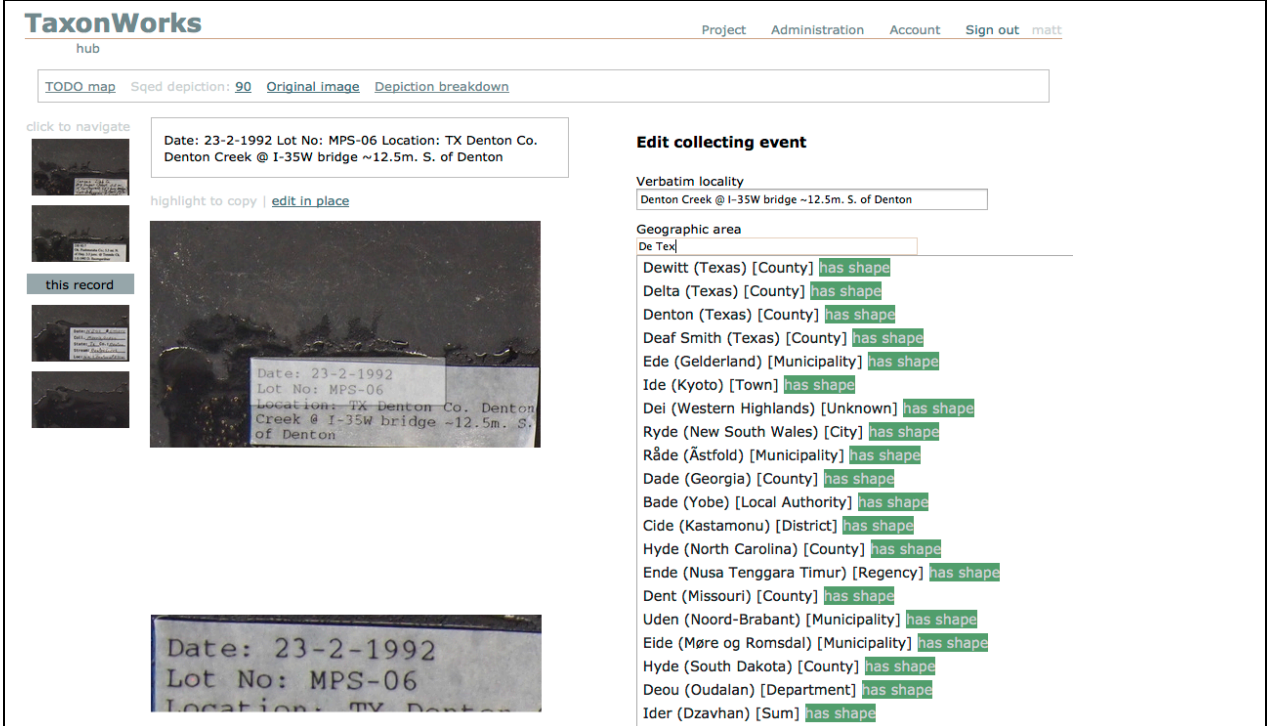


Fig. 6. TaxonWorks with pick list for county and state names. Selection helps with sorting that will group similar collecting events.

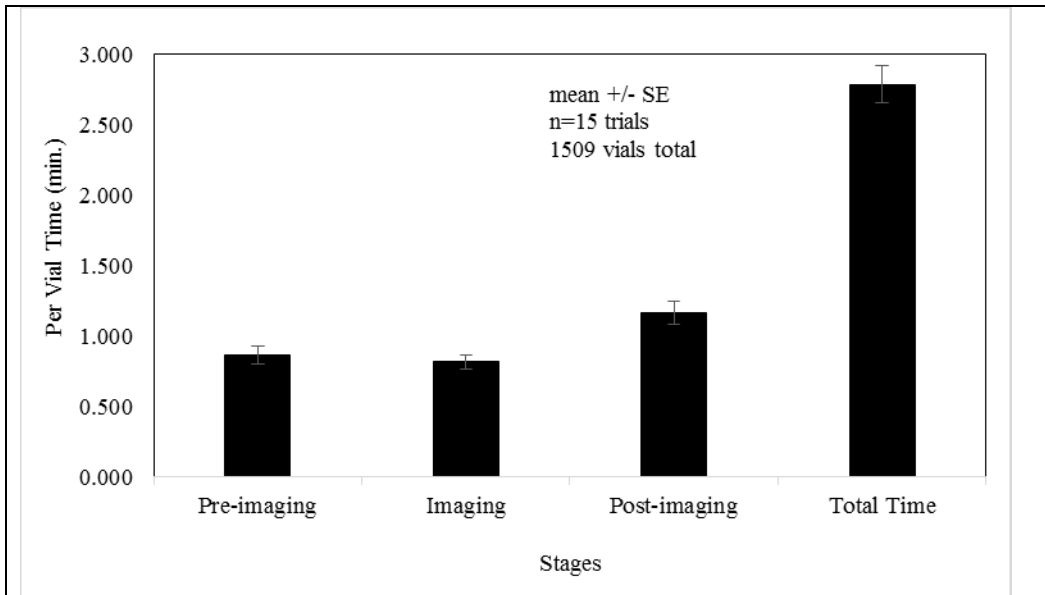


Fig. 7. Per vial timing for accessioning 1,509 vials of the K. W. Stewart Collection.

**RECENT PLECOPTERA LITERATURE (CALENDAR YEAR 2015 AND**

**EARLIER).** Papers made available after 1 February 2016 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.

Abong'o, D.A., S.O. Wandiga, I.O. Jumba, P.J. Brink, B.B. Naziriwo, V.O. Madadi, G.A. Wafula, P. Nkedi-Kizza, and H. Kylin. 2015. Occurrence, abundance and distribution of benthic macroinvertebrates in the Nyando River catchment, Kenya. *South African Journal of Aquatic Science* 40:373-392.

Arai, R., K. Nukazawa, S. Kazama, and Y. Takemon. 2015. Variation in benthic invertebrate abundance along thermal gradients within headwater streams of a temperate basin in Japan. *Hydrobiologia* 762: 55-63.

de Araujo, A.V. and R.S. Peixoto. 2015. The impact of geomorphology and human disturbances on the faunal distributions in Tiquara and Angico Caves of Campo Formoso, Bahia, Brazil. *Ambient Science* 2:25-30.

Aazami, J., A.E. Sari, A. Abdoli, H. Sohrabi and P. J. Van den Brink. 2015. Assessment of ecological quality of the Tajan River in Iran using a Multimetric Macroinvertebrate Index and species traits. *Environmental Management* 56(1):260-269.

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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Perla](#)

Jahr/Year: 2016

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