The Entomology Collection at the
Denver Museum of Nature & Science

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Overview of the Entomology Collection

The DMNS entomology collection consists of 803,000 specimens (Jan. 2012). At its current growth rate (~2.2% per year), we are adding an average of 20,000 specimens per year. The unprepared backlog is being processed at a rate of 20-30,000 specimens per year. The collection spans 1880-present. Holdings are worldwide in coverage and comprise all major insect orders, with a particular focus on Coleoptera (86%) and Lepidoptera (12%). Only 0.4% of specimens are currently cataloged in a paper catalog and none are presently databased.

The collection's primary strength is its worldwide focus (65% of specimens from Africa, 20% regional, 15% from other regions), which distinguishes the DMNS entomology collection from other large insect collections in the region with mainly regional holdings. Nevertheless, the DMNS regional holdings are also strong, particularly in the Lepidoptera and in several families of Coleoptera (e.g., Scarabaeidae and Tenebrionidae). In 2008, Curator of Entomology Frank Krell initiated the creation of a Colorado State Reference Collection for Coleoptera, initially based on local holdings and then further developed with an aggressive collecting program across the state. Since its inception the reference collection has quadrupled in size, but is still in need of thorough curation.

The entomology collection includes at least 13 name-bearing types and 152 paratypes described by museum staff and external researchers between 1882 and 2010 (Grote 1882; Aaron & Aaron 1885; French 1884; Cockerell 1905, 1906; Cross 1937a, b; Nonveiller 1960; Peigler 1992; and Peigler & Kendall 1993, for holo- or syntypes). An illustrated catalogue of the type specimens in the entomology collection is in preparation. The Lepidoptera holdings are summarized by Bettman in this volume (Bettman 2012).
History of the Entomology Collection

The Denver Museum of Nature & Science has gone by several names in its history: first called the Colorado Museum and Library Association (1897–1900), then the Colorado Museum of Natural History (1900–1947), the Denver Museum of Natural History (1948–2000), and currently the Denver Museum of Nature & Science.

The growth of the entomology collection began soon after the incorporation of the Museum in 1900 with the activity of the first entomology curator, **Ernest J. Oslar** (1908-1911). Oslar was a professional insect collector who collected around 10,000 specimens of mainly regional Lepidoptera for the Museum. Some material from Africa was also donated during his tenure. There appears to have been a disagreement with Museum leadership when Oslar presented an invoice for these specimens, and this led to his departure. Only a few Oslar specimens have been identified in the collections to date. A decade later, in 1918, **John T. Mason**, an avid collector with a wealth of contacts in the lepidopterist community and Museum manager from 1900-1910, donated a worldwide collection of 20,000 butterflies and moths to the Museum (Webb & Peigler 1990). His donation contained important historical material, type specimens, and many tropical species rare in collections. Specimens from the Mason collection first went on display in the Museum from 1929 to 1938. A more extensive exhibit was then constructed and the Colorado Butterflies and Moths Exhibit opened in 1940, funded by Mrs. Dora Porter Mason and presented in a hall named after this benefactress. This exhibit closed in 1986 during Museum expansion.

Mr. **Frank Howland**, Curator of Minerals and Geology, served as caretaker of the entomology collection from the late 1920s through 1935. From 1936-1938, **Frank Clay Cross** became the Honorary Curator of Entomology. Together with his assistants, **Robert Potts** and **Charles W. Dawson**, he reorganized the collection and rediscovered several type specimens (Webb & Peigler 1990). **Walker Van Riper** served as Curator of Insects and Spiders from 1943 to 1959, with **W.H. Tyeryar**
serving as Associate Curator in 1958. This period of moderate growth was followed by more than a decade of stagnation.

From 1972 to 1977, Marc E. Epstein was on contract, extensively collecting and curating butterflies. Epstein was at the Smithsonian for 15 years and is now a systematist at the California Department of Food and Agriculture. Michael G. Pogue, currently at the USDA/Smithsonian, was employed as Curatorial Assistant from 1975-1979, having been responsible for the curation of birds and insects. He donated his personal collection of butterflies, mostly from Colorado, when he left. Marc and Michael, with the help of volunteers, upgraded the collection significantly, particularly by transferring the Mason collection from cork-bottomed drawers to modern Cornell drawers. During the following decade, the insect collection again entered a stagnant period.

From 1990-1997, lepidopterist Richard S. Peigler worked at the Museum, first as Collections Manager, then as Curator of Entomology. The insect collection resumed moderate growth during his tenure. Peigler's rearing and hybridization experiments on wild silkmoths are well documented in the collection. Also during this period, many improvements were made to collection storage conditions and protocols that positively impacted the entomology collection. These included improvement of collections care by increased environmental monitoring and implementation of an Integrated Pest Management program in 1988.
From 1998-2006, arachnologist **Paula Cushing** was the curator responsible for the entomology collection. Her extensive Colorado Spider Survey resulted in thousands of non-target insects being collected in pitfall traps all over the Rocky Mountains and the western Great Plains. Cushing also accepted a donation of extraordinarily beautiful specimens (with collection data) collected over a century ago by **Clarence Riker** (inventor of the "Riker mount", a glass covered shallow box commonly used for displaying insects) and stored in Riker's original hand-made cabinet mounts. The Riker collection was accepted for its historical value as well as its outreach value for behind-the-scenes tours, art projects, and exhibits.

In January 2007, **Frank Krell** was hired as the Curator of Entomology responsible for both the entomology collection and the small herbarium. Krell has significantly increased the activity level of the entomology collection by hiring and training a substantial volunteer corps and starting regional collecting activities such as the Colorado Scarab Survey and the Colorado Beetle Reference Collection, hosting scientific meetings such as the 20th High Country Lepidopterists' meeting in 2009 (Krell 2009) and the current Combined Annual Meeting of the Lepidopterists' Society and the Societas Europaea Lepidopterologica. Approximately 700,000 newly accessioned insect specimens have been added over the last five years. This recent growth was achieved through intensified regional collecting (10-15,000 specimens/yr), accessioning unprocessed backlog material from 1990-2006, donation-funded projects, and large donated or transferred collections (e.g., **B. Bartell**, **D. Bettman**, **E. Cano**, **T. Cekalovic**, **D.M. Fanara**, **M. Fisher**, **C. Harp**, **S.A. Johnson**, **F.-T. Krell** [225,000 specimens collected between 1977 and 2000, mainly Scarabaeoidea], **A. Mudge**, **P. Moretto**, **S.M. Nelson**, **G. Opie**, **P. Tates**, **B. Vogel**, **I. Winkler**, **F.N. Zeiner**, etc.).

Concurrent with this rapid growth, Krell has also instituted rigorous curatorial procedures; developed an entomology collections manual; developed focused accession policies; established a high-throughput team of trained volunteers that processes about 20-30,000 specimens per year from the unmounted backlog; and attracted a team of department and research associates skilled in Lepidoptera taxonomy, namely **Barbara Bartell**, **David Bettman**, **Chuck Harp**, and **Paul Opler**, who are recurating the extensive butterfly and moth collection. The success with two grants funded by the National Science Foundation in 2012 will help to transform the entomology collection into a modern, accessible collection. The collection became a part of the Southwest Collections of Arthropods Network (SCAN), which will digitize the museum's regional holdings of soil arthropods. A collections improvement grant (CSBR) will provide new cabinetry for the collection's move into a new, state-of-the-art collections preservation facility (currently under construction, completion expected in 2014). Additionally, the CSBR grant provided funding for the hire of **David Bettman** as a Curatorial Assistant in June 2012.

Despite its worldwide holdings containing rare material of high scientific value from both remote tropical areas and from local ecoregions, the collection has remained underutilized by scientific and professional communities during most of its history. Based on loan and data queries, there is a growing interest in the use of DMNS material, but without online publication of the specimen data the visibility and use of the collection would likely remain limited. We therefore plan to disseminate this specimen data on the Museum’s webpage via our newly implemented collections management system KE Emu, and through
GBIF and further portals we will increase accessibility and extend the use and value of the collection significantly.

Acknowledgments

We thank David Bettman, Curatorial Assistant, for additions and suggestions that substantially improved this manuscript.

References


Frank-Thorsten Krell, David Bettman & Todd Gilligan (Eds.)


Combined Annual Meeting of the Lepidopterists' Society and the Societas Europaea Lepidopterologica

Denver – July 2012