

## Introduction

Friederich Forster was a prolific contributor to the collection of dragonflies and damselflies at the UM Museum of Zoology, but relatively little is known about him beyond the specimens he left behind. The UMMZ has 25 drawers of specimens from Forster which were collected from around the globe (Figure 1). The goal of this project is to digitize data about Forster's contributions to the collection. Researchers will investigate the geographic and taxonomic distribution represented, learn about the history of a significant collector, and make the data accessible to other researchers. The Natural History State Collection in Germany is gathering data on zoological collections and collectors from Germany, so our research project will contribute to that dataset.



Figure 1: Specimen Drawers

## Methods

In order to explore and document the specimens Forster collected research assistants:

- Assigned specimens a unique identifier number with QR code
- Removed handwritten data labels
- Arranged specimen and corresponding data labels on foam stage (Figure 2)
- Imaged specimen with all labels using a DSLR camera (Figure 3)
- Uploaded images from memory disk to google drive
- Scanned QR codes to rename images by their unique identifier



Figure 2: Specimen image set-up



Figure 3: Digitization Station Set-up

To record data research assistants:

- Transcribed labels and recorded all data in a spreadsheet (Including catalog number, taxonomic information, location information, and sex)
- Used Google Translate to translate labels as needed
- Used taxonomic databases (IUCN Red List and World Odonata Catalog) to identify species determiners
- Used Google Maps to identify coordinates of collection locations

To summarize the data research assistants:

- Uploaded Coordinates to Google Earth and Bat Geo to plot data and create map visuals (Figures 4, 5, 6, and 7)
- Used Pivot Tables in Google Sheets to summarize spreadsheet data

The spreadsheet information will be uploaded to Specify, the UMMZ database and shared with the UM Digital Library. The information will also be uploaded to the aggregate databases GBIF, SCAN, and iDigBio so that researchers from Germany, the US and around the world can access the information for their own projects.

## Results



Figure 4: Map of the 32 Countries represented by the specimen collection

In total:

- 272 Specimens were transcribed
- 32 Countries from 6 continents were represented. (It is unlikely that Forster visited all 32 of the countries. Many of the labels list different collectors, from which Forster obtained the specimens) (Figure 4)
- 7 Families represented (Table 2)
- 40 Unique Species represented (Table 1)

Table 1: List of species names in collection

### Summary list of Species

**Aeshnidae**  
*Adversaeschna brevistyla* (Rambur, 1842)  
*Aeshna brevivrons* (Hagen, 1861)  
*Aeshna caerulea* (Ström, 1783)  
*Aeshna castor* (Brauer, 1865)  
*Aeshna cyanea* (Müller, 1764)  
*Aeshna grandis* (Linnaeus, 1758)  
*Aeshna juncea* (Linnaeus, 1758)  
*Anax guttatus* (Burmeister, 1839)  
*Anax imperator* Leach, 1815  
*Anax papuensis* (Burmeister, 1839)  
*Anax parthenope* (Selys, 1839)  
*Anax speratus* Hagen, 1867  
*Boyeria irene* (Fonscolombe, 1838)  
*Castraeschna januariala* (Hagen, 1867)  
*Cpryaeschna ingens* (Rambur, 1842)  
*Gynacantha bifida* Rambur, 1842  
*Gynacantha cylindrata* Karsch, 1891  
*Gynacantha nervosa* Rambur, 1842  
*Gynacantha rosenbergi* Kaup in Brauer, 1867  
*Gynacantha trifida* Rambur, 1842  
*Rhionaeschna bonariensis* (Rambur, 1842)  
*Rhionaeschna brevivrons* (Hagen 1861)  
*Rhionaeschna californica* (Calvert, 1895)  
*Rhionaeschna cornigera* (Brauer, 1865)  
*Rhionaeschna diffinis* (Rambur, 1842)  
*Triacanthagyna septima* (Selys in Sagra, 1857)  
*Triacanthagyna trifida* (Rambur, 1842)

**Chlorocyphidae**  
*Rhinocypha sumbana* Foerster, 1897

**Lestidae**  
*Lestes ochraceus* Selys, 1862

**Libellulidae**  
*Libellula saturata* Uhler, 1857  
*Microtrigonia marsupialis* Foerster, 1903  
*Neurothemis decora* (Kaup in Brauer, 1866)  
*Neurothemis septentrionis* Foerster, 1904  
*Sympetrum pedemontanum* (Mueller in Allioni, 1776)  
*Tamea limbata* (Desjardins, 1832)  
*Tamea loewii* (Kaup in Brauer, 1866)

**Megapodagrionidae**  
*Nesolestes alboterminatus* Selys, 1891

**Platycnemididae**  
*Tatocnemis malgassica* Kirby, 1889

**Platycnemididae**  
*Palaeargia humida* Foerster, 1903  
*Propatycnemis alatipes* (McLachlan 1872)

- Forster was the "Authority" for several of the specimens, meaning that he was the first person to discover and describe the species. These species were *Microtrigonia marsupialis*, *Neurothemis septentrionis*, *Palaeargia humida*, and *Rhinocypha sumbana*.
- The oldest specimen was from May 16, 1878.
- The most recently collected specimen was from June 16 1915.



Figure 5: Map of Collection Events in Europe



Figure 6: Map of Collection Events in South America



Figure 6: Map of Collection Events in Africa

## Results Continued



Figure 7: Map of Collection Events in Asia

Table 2: Families of Specimens

Family (Dragonflies)	Count
Aeshnidae	93
Gomphidae	29
Libellulidae	110
Family (Damselflies)	Count
Chlorocyphidae	1
Lestidae	1
Megapodagrionidae	3
Platycnemididae	2

## Discussion

The purpose of this study was to transcribe and digitize the Forster collection so that the data contained within the collection may be used by researchers here at the University of Michigan and around the world for their own research and studies. This project itself does not draw any conclusions from the data collected, but there are a few future directions in which this data may be studied to enrich knowledge in the field of entomology, taxonomy, and environmental studies. Data on the past range of these specimens can show how the environment and landscape of these species has changed overtime. This data can help supplement future research in these areas, as well as others. Most importantly this data is being uploaded to a database so that scholars around the globe may access it for their own academic pursuits.



Figure 8: Specimens in Drawer

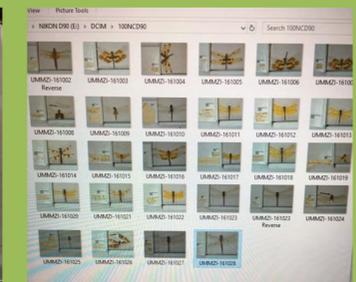


Figure 9: Digitized Specimens

## References

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- Schorr, M., & Paulson, D. (2020, April 9). World Odonata List, University of Puget Sound. Retrieved April 13, 2020, from <https://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/world-odonata-list2/>
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