SIGNIFY in Havard

Five Weeks in Massachusetts

The Museum of Comparative Zoology (MCZ) at Harvard University was one of the SIGNIFY team's priority institutions as literature review uncovered over 100 specimens of interest, including some very important types and historical materials. The team made a productive five-week visit to MCZ starting 22 April 2024—albeit one kickstarted with unforeseen challenges. Just two days prior to departure, torrential downpours hit Dubai, flooding much of the city and delaying the team's connecting flight by 10 hours. The missed flight to Boston also resulted in delays on the arrival of luggage containing essential digitisation equipment. Despite the rocky start, the team had a fruitful time working with the collection team at Havard. This story showcases some specimens of interest that were digitised by the team.

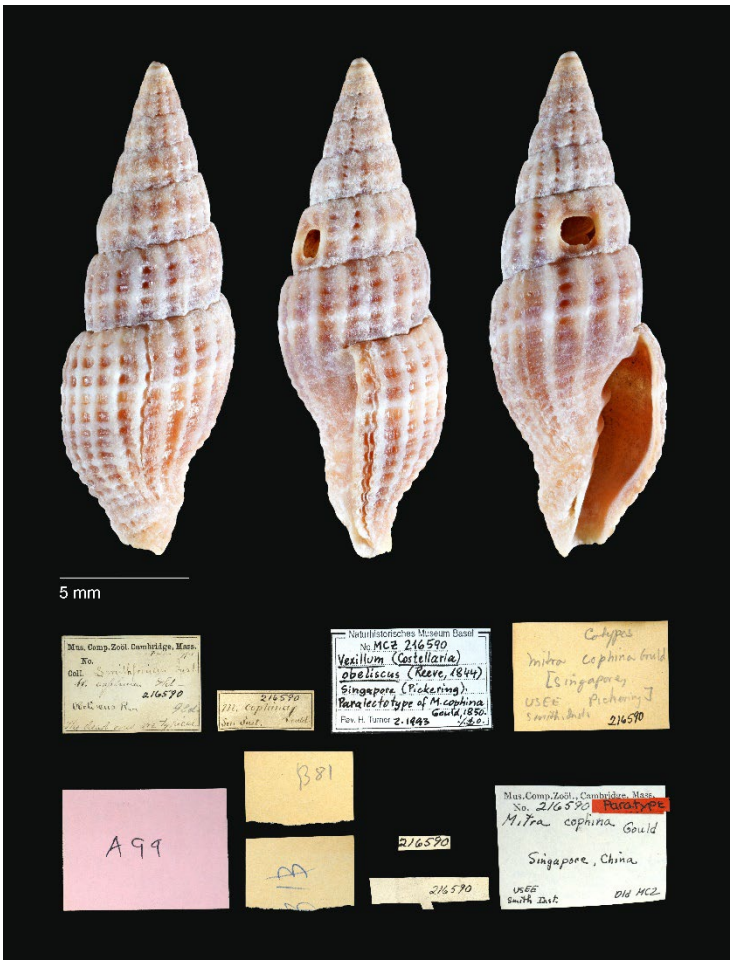
Week 1: Malacology, Mammals, Aves

The first week was dedicated to the extensive mollusc, mammal, and bird collections in MCZ. These specimens comprise some of Singapore's rich biodiversity, from rare molluscs to resident bird species. *Cyclophorus aquilus*, a terrestrial snail, is one such specimen that the team imaged. Collected by Hugh Cuming who visited Singapore in 1840, this specimen is now over 180 years old. It is a valuable addition to the SIGNIFY database as it can provide researchers with crucial insights into historical biodiversity.

Cyclophorus aquilus specimen, collected from Singapore (Museum of Comparative Zoology, MCZ-228014)
Source: SIGNIFY

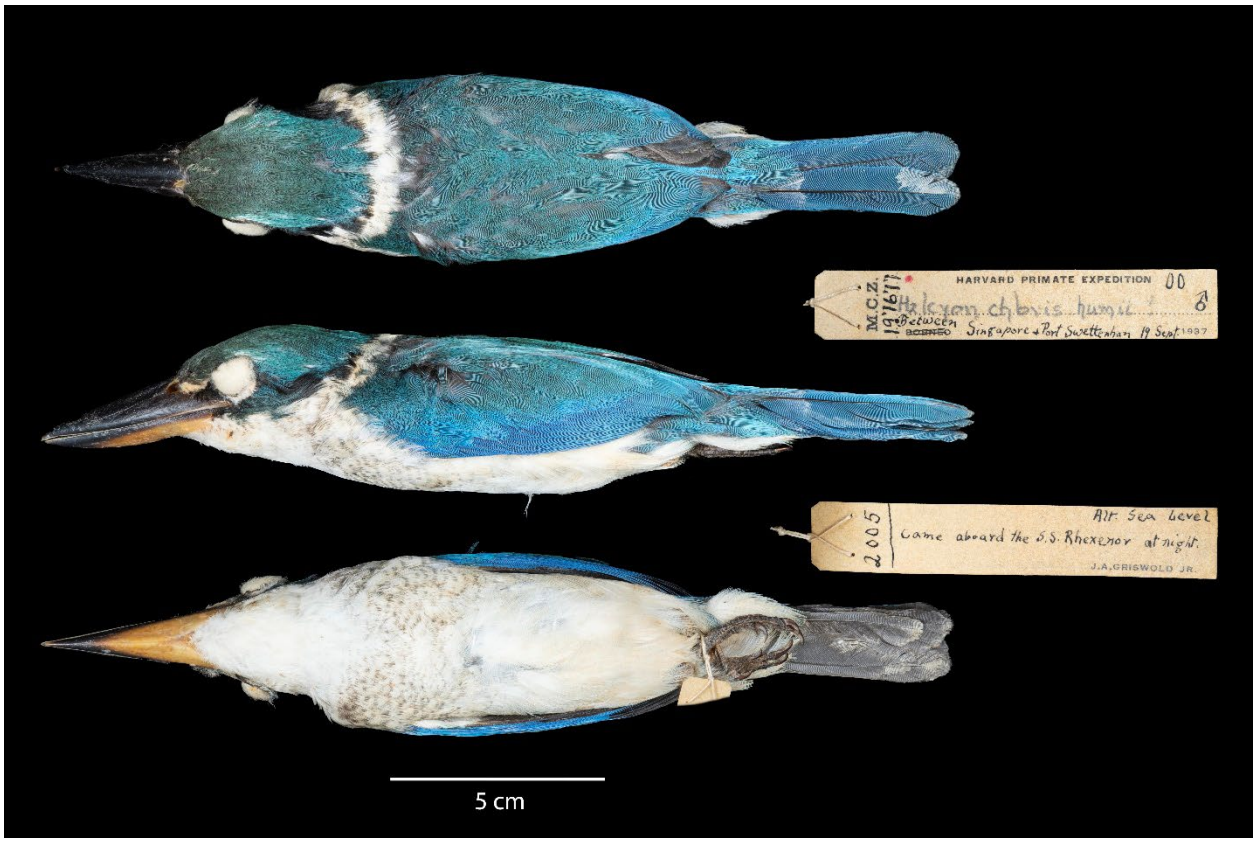
Marine molluscs such as *Vexillum sculptile*, commonly known as the carved mitre, were also imaged. This specimen was collected during the United States Exploring Expedition (U.S. Ex. Ex.) (1838–1842) by Charles Pickering, an American naturalist and physician at Harvard,

during a stopover in Singapore on 19th February 1842. The U.S. Ex. Ex. was a major exploration effort made by the United States in the 19th century. Spanning four years (1838–1842), over 60,000 plant and animal were collected by the expedition, contributing to much of the 19th century American scientific development. Pickering was one of several American naturalists who were onboard and curated the natural history collections from the expedition. This specimen was one of the type specimens used by the eminent American malacologist (and Harvard alumnus), Augustus Addison Gould, in the description of *Mitra cophina*. This name is now considered a synonym (a different name for the same species) of *Vexillum sculptile*.



Paratype of *Vexillum sculptile* collected by Pickering (Museum of Comparative Zoology, MCZ- 216590)
Source: SIGNIFY

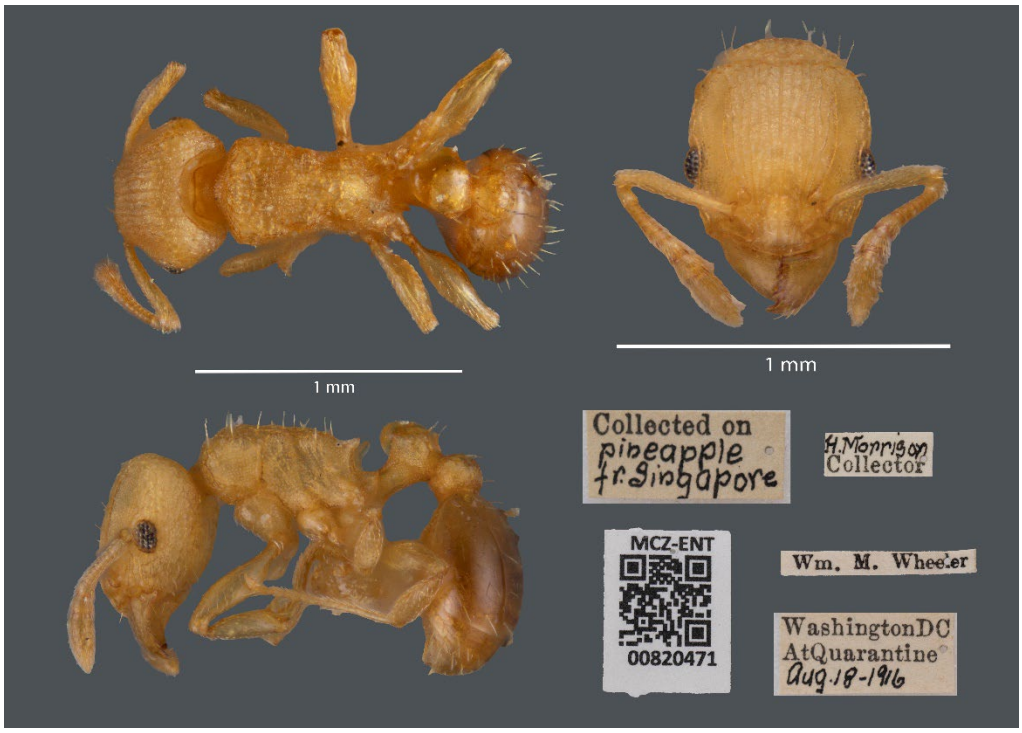
MCZ also houses an extensive ornithology collection. Within this collection was a specimen of *Todiramphus chloris humii* (collared kingfisher), which was opportunistically collected when it flew on board the S.S. *Rhexenor*—a steamship transporting goods and passengers. Originally named *Halcyon chloris humii.* This is an example of how the information on specimen labels can provide some context to the collection event itself.



Todiramphus chloris humii specimen collected onboard the S.S. *Rhexenor* (Museum of Comparative Zoology, MCZ-197677)
Source: SIGNIFY

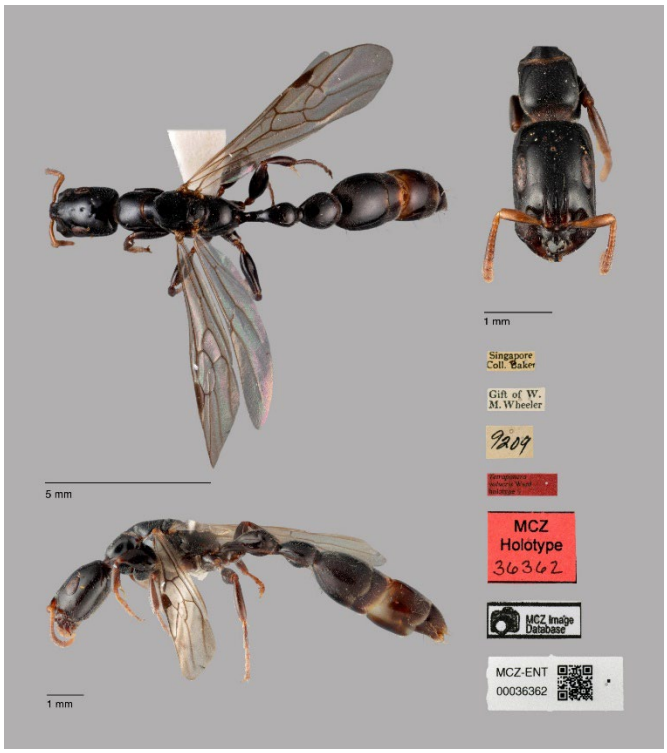
Weeks 2 & 3: Entomology

In the next two weeks, the team's focus shifted to the entomology department. The impressive collection ranges from butterflies to beetles to bees and includes some of the most precious collection of ants in the world. The challenge of searching for Singapore specimens was surmountable with excellent curation of the collection, whereby each group was well-organised into major bioregions. Throughout the two weeks the team came across several specimens with interesting origins. The first example is that of *Tetramorium simillimum*, a widely-distributed ant species, with a specimen found on a pineapple imported from Singapore.

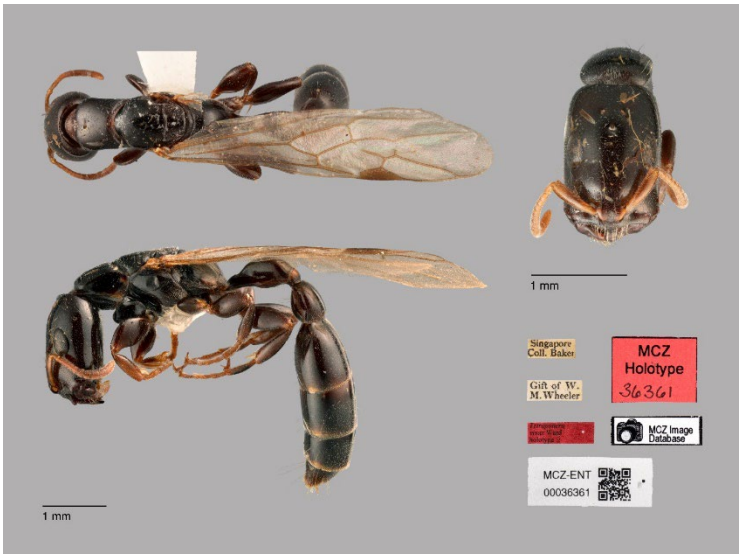


Tetramorium simillimum specimen collected from a pineapple (Museum of Comparative Zoology, MCZ-ENT-00820471)
Source: SIGNIFY

Next, the team worked with two holotype specimens of ants of the genus *Tetraponera*—*T. volucris*, known only from the holotype collected in Singapore, and *T. vivax* which is known from three specimens collected from Singapore, and what are today Sabah (in Malaysia) and Bogor (in Indonesia).



Holotype specimen of *Tetraponera volucris*, collected by Baker (Museum of Comparative Zoology, MCZ-ENT-00036362)
Source: SIGNIFY



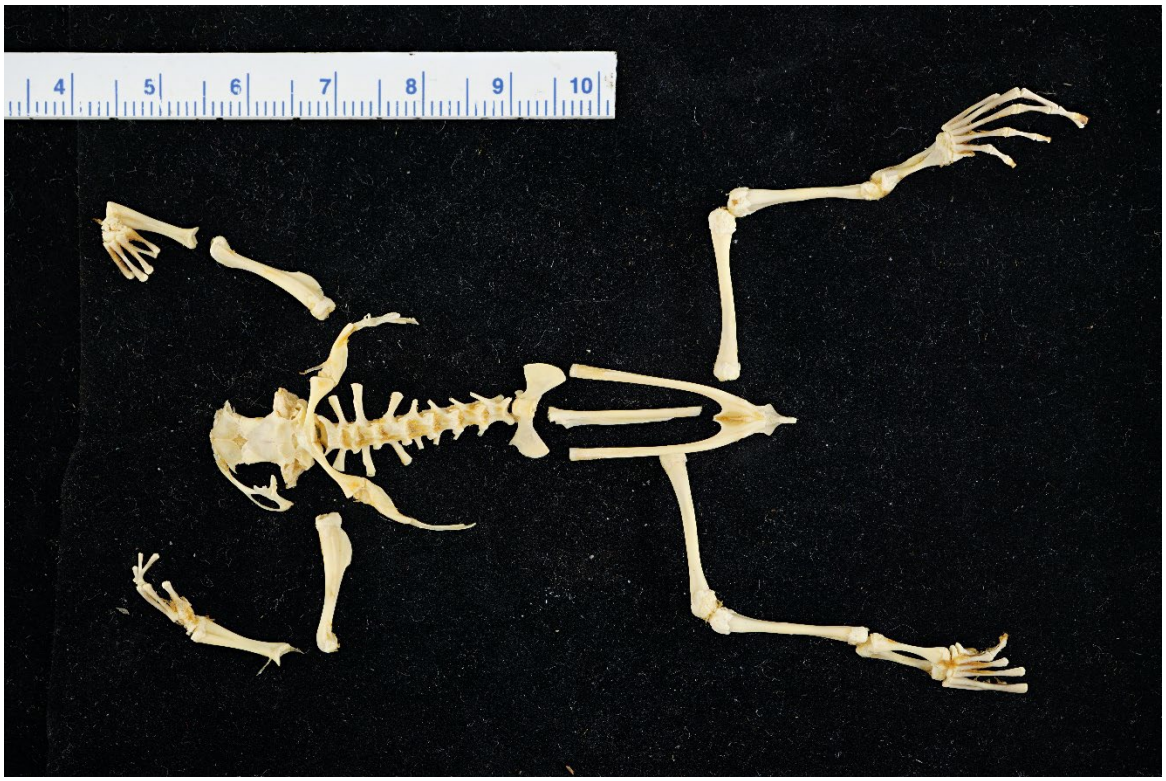
Holotype specimen of *Tetraponera vivax,* collected by Baker (Museum of Comparative Zoology, MCZ-ENT-00036361)
Source: SIGNIFY

Week 4: Herpetology

In the fourth week, the team moved to the herpetology department—home to the amphibians and reptile specimens. One specimen stood out among the rest: *Kaloula pulchra*, commonly known as the banded bullfrog. This species is now a common sight in Singapore, having

been introduced in the 1880s. Apart from fluid-preserved specimens, the collection also housed some skeleton examples of the species. The preserved specimen was collected by John Coney Moulton, the director of the Raffles Library and Museum (RLM) during the early 1920s. The natural history specimens from the RLM form the core (and oldest) collections of the Lee Kong Chian Natural History Museum (LKCNHM) at the National University of Singapore, which is also the home of SIGNIFY. This means that there is a historical link between MCZ, LKCNHM and SIGNIFY that goes back a long way!

Kaloula pulchra specimen, donated by J.C. Moneton (Museum of Comparative Zoology, MCZ-R-9363)
Source: SIGNIFY

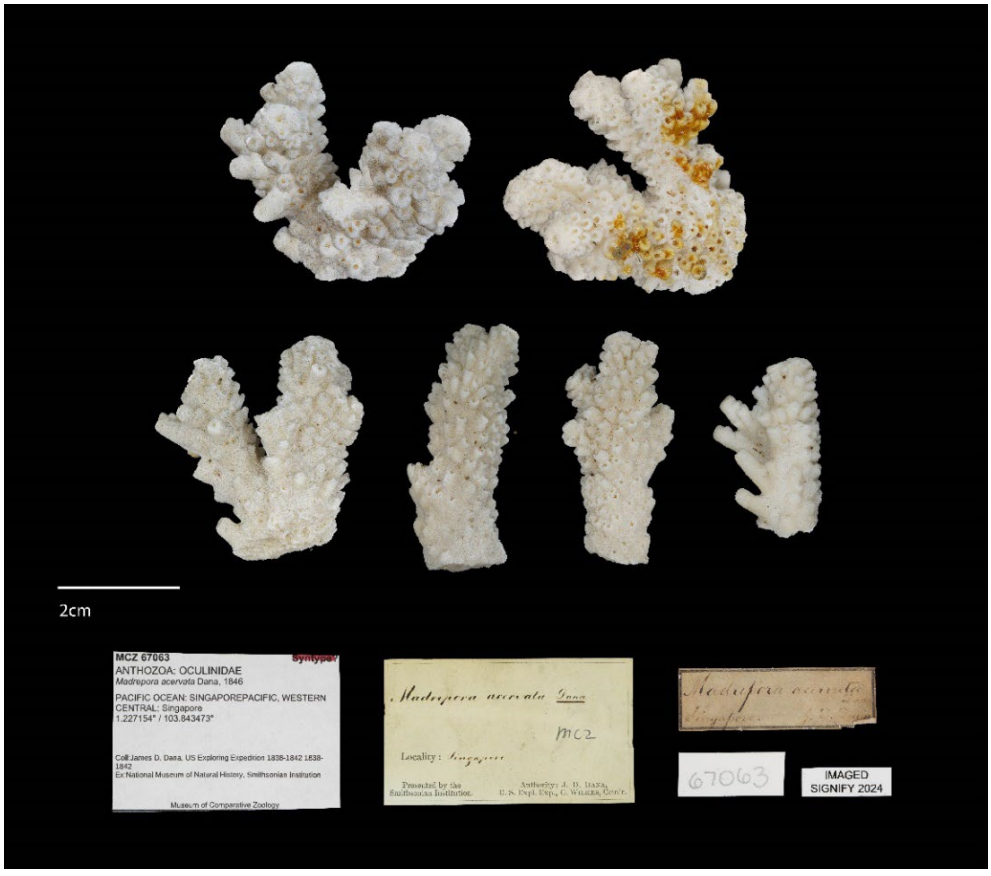


Skeletal specimen of *Kaloula pulchra* (Museum of Comparative Zoology, MCZ-R-9369)
Source: SIGNIFY

Week 5: Invertebrate Zoology & Ichthyology

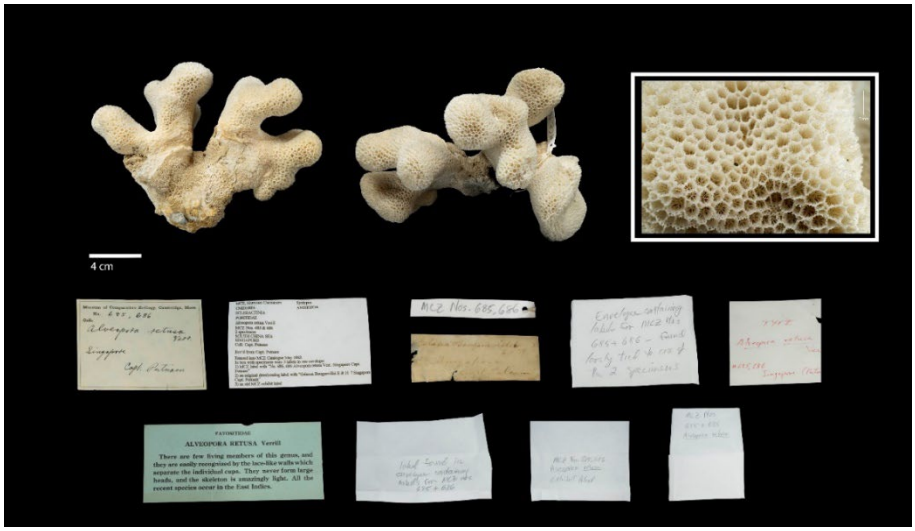
The team's final week in MCZ were spent in the invertebrate zoology and ichthyology departments. The invertebrate zoology department comprises of specimens from a variety of phyla, including jellyfishes, corals, starfishes, brittle stars, and even sea urchins. Of interest were syntypes of *Alveopora retusa* (currently known as *Alveopora fenestrata*, a stony coral), *Oxypora lacera* (ragged chalice coral), a widespread but uncommon species native to the Indo-Pacific region, and *Acropora acervata* (a horn coral), a species responsible for forming the calcium carbonate structures that support coral reefs. One coral specimen of the genus *Favia* also caught the team's attention—a reef-building stony coral that is often flat or dome-shaped. These corals are known to be nocturnal feeders, utilising their tentacles to sting prey or other corals.

Oxypora lacera specimen (Museum of Comparative Zoology, MCZ44065)
Source: SIGNIFY



Acropora acervata specimen, collected by James D. Dana during the U.S. Ex. Ex. (Museum of Comparative Zoology, MCZ67063)
Source: SIGNIFY

Euphyllia spheniscus syntype collected during the U.S. Ex. Ex. (Museum of Comparative Zoology, MCZ-CNID-5461)
Source: SIGNIFY



Alveopora retusa specimen collected by Captain Putnam (Museum of Comparative Zoology, MCZ-SCOR-685-686)
Source: SIGNIFY

Among the echinoderm specimens imaged was *Ophiogymna elegans* (a brittle star). Though widespread on Singapore's shores, this species is not often observed as it tends to shy away from light during the day.

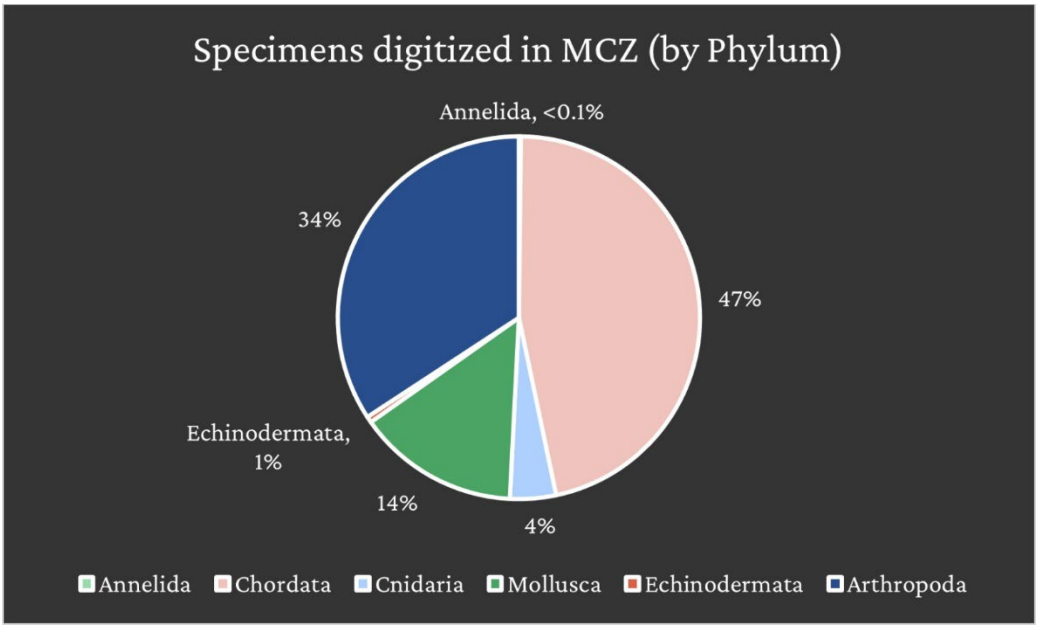
Cotype specimen of *Ophiogymna elegans* (Museum of Comparative Zoology, MCZ-OPH-2500)
Source: SIGNIFY

The team rounded up the trip with a last stop at the Ichthyology department. The team digitised a juvenile specimen of *Rhizoprionodon oligolinx* (grey sharp-nose shark). Singapore's waters is home to 13 shark species at present, seven of which are critically endangered. The *Rhizoprionodon oligolinx* is currently also listed as near threatened by the IUCN Red List of Threatened Species, making this specimen particularly valuable.

Paratype specimen of *Rhizoprionodon oligolinx*, collected by Captain Putnam (Museum of Comparative Zoology, MCZ-180)
Source: SIGNIFY

A summary of the trip

In the five weeks that the team spent in MCZ, a total of 597 specimens were imaged, comprising of: 1 Annelida, 192 Arthropoda, 262 Chordata, 27 Cnidaria, 3 Echinodermata and 112 Mollusca. The phyla Arthropoda and Chordata made up majority of the specimens that were digitised (76%).



Breakdown of specimens digitised at MCZ, Harvard

This visit also allowed the team to gain invaluable experience from collaborating with the fellow staff from MCZ. Besides getting a glimpse into the museum's rare collections, to learning how their specimens are preserved and organised, there were much more insights that the team brought home besides the digital specimens!

In recognition of the hospitality and generosity from MCZ staff, the SIGNIFY team would like to reiterate their thanks and appreciation to the Director of the Museum of Comparative Zoology, Gonzalo Giribet, for making this visit a possibility. The team also thank the Curatorial Associate/Collection Manager Jennifer Trimble for coordinating the digitisation activities, the incredible team of collection managers, curatorial associates and everyone else who supported SIGNIFY with much kindness and patience.

Research and text by Calista Wong