THE CARLETON B. MOORE METEORITE COLLECTION AT THE BUSECK CENTER FOR METEORITE STUDIES (BCMS), ARIZONA STATE UNIVERSITY (ASU), Rhonda M. Stroud, Devin L. Schrader, Laurence A.J. Garvie, Jemma Davidson, Amy J.G. Jurewicz, and Rebekah Hines. Buseck Center for Meteorite Studies, School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287, USA

Introduction: The Buseck Center for Meteorite Studies (BCMS) at Arizona State University (ASU) curates the Carleton B. Moore Meteorite Collection, one of the largest university-owned collections. Established in 1961 as The Center for Meteorite Studies (CMS), the center was renamed the Buseck Center for Meteorite Studies in 2021, in honor of ASU Regents Professor Emeritus Peter Buseck. The BCMS mission is to create and share new knowledge in the field of meteoritics and allied disciplines through:

1) Cutting-edge research on the origin of our Solar System and planets, including the pathways to forming habitable worlds;
2) Increased science return from spacecraft-based exploration through laboratory-based analysis of returned and recovered extraterrestrial samples.
3) Curation and distribution of one of the finest meteorite collections in the world; and
4) Broad dissemination of the latest scientific results and education at local, national, and global scales.

Information on the Center, and a searchable collection database can be found at https://meteorites.asu.edu https://meteorites.asu.edu/collection/specimen-catalogue.

The Collection: The Center houses >2200 falls and finds represented by over 40,000 specimens, in a modern, purpose-built, climate-controlled, curatorial facility (nicknamed ‘the vault’) (Fig. 1a,b). The vault’s three dry-nitrogen-purged cabinets are dedicated to the curation of carbonaceous chondrite falls. The collection includes representative samples of nearly 40% of all classified iron meteorites, with especially strong representation of historic irons. Among the many significant meteorites in the Collection are: the 313 kg Hugoton OC, a beautifully regmaglypted 117 kg Henbury iron, a 1.5 kg piece of the Bishopville 1843 aubrite fall, the 12.7 kg flight-oriented Bruno iron, one of only a few remaining unsmelted pieces of the 1.5 t Bitburg iron meteorite, 95 g of Bells including a complete 25.2 g fusion-crusted stone, and representative pieces of 17 individual Sutter’s Mill stones. In addition, the Center curates a large collection of impact and related materials from Meteor Crater, together with over 500,000 tektites.

Meteorite loans: The BCMS has a robust loan program with nearly 1000 meteorites loaned for research and education within ASU and worldwide since 2017. Loan numbers are 2017 (108), 2018 (149), 2019 (171), 2020 (174), 2021 (106), 2022 (120), and 2023 (155). Specimen request forms are online at https://meteorites.asu.edu/collection/loan-request. All meteorite loan requests are reviewed by the Director (Stroud), Deputy Director (Schrader), and Curator (Garvie).

Meteorite acquisitions: BCMS actively acquires meteorites through new classifications, donations, and occasionally through trades. Since 2008, the collection has grown from 1577 total meteorite falls and finds to 2256, for an average of ~45 new meteorite acquisitions per year. The acquisitions since 2008 include 108 falls for a total of 573 falls. Notable examples for which BCMS houses significant masses include Aguas Zarcas, Dishchii’bikoh, Dong Ujimqin Qi, Glendale, Sutter’s Mill, Tarda, Tigliit, and Tissint. Since 1961, the Center has benefited greatly from donations, and since 2018 has received over $1M in meteorite donations. Some notable donations include ~0.5 kg of Aguas Zarcas, an 11 kg complete fusion-crusted Allende stone, several slices of the Milton pallasite, fusion-crusted stones of Tissint, a large selection (>3000 stones) of the Chelyabinsk fall, several pieces of NWA 7034 aka “Black Beauty”, and a significant number of Tarda stones.

Meteorite gallery, education, outreach and social media: Educational engagement across all levels, from K-12 to postdoctoral is integral to the BCMS mission. The BCMS Postdoctoral Fellowship in Meteorites Studies was inaugurated in 2023, with the first fellow slated to join the Center in the summer of 2024. Future BCMS postdoctoral fellowship awards are anticipated on a 2-3 year rotating basis. In early June 2024, the Center will host a microparticle handling workshop jointly with Johnson Space Center (JSC) (Fig. 1c). The workshop is NASA-sponsored and administered by the LPI. Ongoing educational activities of the BCMS include a gallery open to the general public with a wide range of meteorites on display. The gallery, which receives over 10,000 visitors per year, hosts regular Open House nights and two public events with a “meteorite identification” booth for the public to bring in their suspected meteorites. The BCMS also offers loanable classroom modules focusing on The Origin of Meteorites free of charge to K-12 and informal educators. In addition to on-campus and local ASU public outreach events, the Center maintains an active online presence on both its website and social media. BCMS sends regular electronic newsletters, and uploads Facebook and YouTube posts of meteorite news, facts, and photos.
Figure 1. a) and b). Photographs of the BCMS vault. The foreground in (a) shows specimens of Toluca, Gibeon, and Henbury. The photograph in (b) shows three large Allende stones - 7.8 kg, 9.9 kg, and 14.6 kg. c) Director Stroud’s particle processing laboratory.