Leafing Through History
Several divisions of the Missouri Botanical Garden shared their expertise and collections for this exhibition: the William L. Brown Center, the Herbarium, the EarthWays Center, Horticulture and the William T. Kemper Center for Home Gardening, Education and Tower Grove House, and the Peter H. Raven Library.

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Many thanks to the artists who have shared their work with the exhibition. Especial thanks to Virginia Harold for the photography and Studiopowell for the design of this publication.

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Plants comprise 90% of what we use or make on a daily basis, and yet, we overlook them or take them for granted regularly. One of the most important—and ubiquitous—plant products is the material on which the text you’re reading is printed: paper. Paper has made an indelible impact on human history, particularly in writing, design, art, and the spread of information through books and newspapers.

There are many plants that are used around the world to make paper and they are treated via different methods of papermaking to produce the thin, portable, and inexpensive material that we use in a myriad of ways every day. In honor of the first anniversary (the paper anniversary!) of the Stephen and Peter Sachs Museum reopening to the public at the Missouri Botanical Garden, the Leafing Through History exhibition is the Museum's first interdisciplinary exhibition, which highlights the science, history, and art of paper and papermaking.

Invented in China over 2,000 years ago, true paper is made from macerated plant and textile fibers, such as pine trees, cotton, hemp, linen, and paper mulberry; the fiber is mixed with water to create a pulp slurry, formed in molds, pressed, then dried, and pressed again (also called calendering). Though we get the word “paper” from the ancient Egyptian papyrus plant, papyrus together with ancient American amate and Polynesian tapa cloth are not considered true paper because the cellulose fiber of the plant is not macerated into a pulp slurry and formed with molds. These paper-like materials are made by stripping the inner bark of the plants, and pounding these fibers with mallets or stones until they form flattened, flexible sheets that are used as writing material or for other purposes.

Gossypium hirsutum (Mexican cotton)
Mallow family (Malvaceae)
Courtesy of the Herbarium [3328520]
Linum usitatissimum (Flax)

Flax family (Linaceae)

Broussonetia papyrifera (Paper mulberry, Kozo, Kappa)

Fig family (Moraceae)
The Missouri Botanical Garden is one of the leading botanical gardens in the world, and one of its most important collections is the Herbarium—which currently holds more than 7 million specimens. An herbarium is a collection of plants that have been collected in nature, dried and pressed flat, mounted onto paper, and stored and arranged according to an accepted system of classification.

Luca Ghini, professor of medicine and botany at the University of Pisa (1490-1556) is credited with inventing the herbarium, in which plant specimens were glued in a decorative arrangement in a single sheet of paper. Carolus Linnaeus, who created the binomial nomenclature of scientific classification, continued using the term “herbarium” instead of another earlier term, hortus siccus (Latin for “dry garden”). Linnaeus also kept each herbarium specimen sheet separate (rather than binding them together into book-like volumes) so that they could easily be reorganized as classification systems were refined.

At the Missouri Botanical Garden, the key team of people who create the specimen sheets are the plant mounters of the Herbarium. They take the specimens that have been collected by Garden botanists working around the world, dried and pressed with newspapers, and then shipped to the Garden Herbarium in St. Louis. The mounters then dip the specimens in a special glue to adhere the plants to the paper. Plant mounters make sure to clearly show both surfaces of leaves and reproductive structures of the plant.

Once the glue has dried, the plant mounters sew the specimen to keep it affixed and stable on the sheet; they use both waxed dental floss and gummed cloth tape.

The Garden’s Plant Mounter team is led by Sally Bommarito and includes JoAnn Bartels, Tom Bernickus, Rita Chiodini, Helga Gross, Ann Spencer, and Laurel Zimmer.
Top Left: *Rhamnoneuron balansae* (dó) Mezereon family (Thymelaeaceae)
Courtesy of the Herbarium [4674037]

Top Right: *Daphne bholua* (lokta) Mezereon family (Thymelaeaceae)
Courtesy of the Herbarium [6188518]

Top Left: *Gnidia linearis* (avoha) Mezereon family (Thymelaeaceae)
Courtesy of the Herbarium [6087343]

Top Right: *Ficus aurea* (Florida strangler fig, amate) Fig family (Moraceae)
Courtesy of the Herbarium [4044069]
Wikstroemia sikokiana (Gampi) Mezereon family (Thymeleaceae) Courtesy of the Herbarium [5737974]

Papier Antaimoro (detail), Madagascar Gnidea linearis 2019 Collection of the William L. Brown Center

Tapa Cloth (detail), Tonga Paper mulberry (Broussonetia papyrifera) Collection of the William L. Brown Center, Gift of Dr. William and Joanne Fogarty [WLBC01211]
<table>
<thead>
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<th>Scientific Name</th>
<th>Common Name</th>
<th>Family</th>
<th>Additional Information</th>
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</table>
| **Pinus echinata** (shortleaf pine) |  | Pinaceae | United States  
|  |  | Courtesy of the Herbarium  
|  |  | 595536 |
| **Pinus taeda** (loblolly pine) |  | Pinaceae | United States  
|  |  | Courtesy of the Herbarium  
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Page 17:
	Choeradodis rhomboidea
	Psychopsis krameriana (Orchidaceae)
	Megasoma elephas
	Cattleya (Orchidaceae)
	Rhombodera latipronotum

Cekouat Elim León Peralta
2017–2019
Courtesy of the artist

Page 18: Model for Shirt Books
Shoko Nakamura
2018
Courtesy of the artist

HydRingEa
Nguyen Quyết Tiến
2018
Courtesy of the artist

Compound of Dodecahedron and Great Dodecahedron
James Lucas
2019
Courtesy of the artist
Tender Blue
Isabella Myers
2017
Courtesy of the artist

Kuehneosaurus
Jon Tucker
2012
Courtesy of the artist

Kudu
Simple Dragon
Grizzly
Shuki Kato
2018
Courtesy of the artist
fenlifenni
Catherine Liu
2018
Courtesy of the artist

Sparrow
Gorilla
Polar Bear
Rob Snyder
2016–2019
Courtesy of the artist

Five-Fold Two-Layer Weave
Robert Lang
2014
Courtesy of the artist
Once paper and paper-like materials were created, they were marked in a variety of ways.

The earliest writing instruments were created over 8,000 years ago, when reeds, metal, or bone styluses were used to impress marks to write on Sumerian clay tablets. Ancient Egyptians and Greeks used reeds and quills to apply inks to papyrus, and ancient Chinese scribes used brushes and reeds to write on paper. Inks could be made with animal, plant, and mineral material, mixed with a liquid, and then the writing tool would be dipped in it to gather the ink to apply to the paper.

Printing with ink is another form of writing on paper. The use of woodblocks for printing was developed in China during the 7th century, and later during the 14th century, the Chinese also invented moveable type. German Johannes Gutenberg united the technologies of moveable type and the press to invent the printing press in 1439. The increased ability of printers to publish books in greater volume and speed than previously possible coincided with the spread of adult literacy and mass communication, enabling the rapid consumption of books and reading throughout the world. Previously, literacy was the domain of higher status individuals, so with the development of printing, the use and distribution of paper as a source of knowledge meant that more people could use the tools to write and read on paper.

Writing instruments also developed in the wake of the printing press. In 1565, a large deposit of graphite (a soft crystalline carbon mineral) was found in Borrowdale, England, and the material was usefully applied as a writing material. Pencils and mechanical pencils were both developed in the years following the discovery, with mass-produced wooden holders designed in Germany to create the modern-day wooden pencil; the rubber eraser was added in the 19th century.

\begin{itemize}
  \item \textit{Cyperus papyrus} (papyrus)
  Sedge family (Cyperaceae)
  Courtesy of the Herbarium [2252503]
  \item \textit{Mechanical pencil} (American or European)
  Gold, amethyst, graphite
  1860
  Courtesy of the collection of the Campbell House Museum, St. Louis, MO [1980.1.312]
\end{itemize}
The Linnaeus Clock (installation view)
Michael Powell, 2019
Courtesy of the artist

Nelumbonaceae (detail)
Megan Singleton, 2016
Courtesy of the artist
To Rest Without Sinking

Nelumbonaceae, commonly named the American lotus is one of thirteen plants identified by the Missouri Department of Conservation as a nuisance aquatic plant. For this body of work, Singleton observed, collected, and experimented with nuisance plants collected from Lake 34 in August A. Busch Memorial Conservation Area. To Rest Without Sinking interprets the plants and landscape of Lake 34 through sculpture and photography, utilizing the lotus plant as inspiration for form and material for papermaking. The kinetic sculptures depict the color pallete of the lotus plants as they begin to desiccate in fall as the pond water recedes. They gently sway on the steel bases. The series of photographs documents the collection sites where Singleton harvested the American lotus plants to transform them into paper. The paper surrounding the photographs is made of giant bur-reed, which she collected from the edges of Lake 34.
Horticulture, biodiversity, and ethnobotany are three aspects of research being conducted by the Missouri Botanical Garden. Throughout this book, these topics are explored through hand papermaking. In the fall of 2018, Megan Singleton began collaborating with the Garden’s horticulture staff to collect a variety of plant species from the garden as they were being pruned back for winter. Twenty different plants, which would have otherwise been composted, were collected, processed, and transformed into unique sheets of handmade paper by the artist for this project.

The book opens with a showcase of these plant-based papers. As you turn the pages, the book transitions to highlight the global missions of the Garden in respect to taxonomy, biodiversity, and ethnobotany. The Missouri Botanical Garden is home to the second largest herbarium in the United States, and is one of the largest collections in the world. Selected herbarium specimens from Bolivia, collected during a 10-year collaborative project between the National Herbarium of Bolivia and the Garden, have been embedded into handmade paper to draw attention to such projects. This collaborative research, “The Madidi Project—A Floristic Inventory Project in Northwestern Bolivia,” came about in response to the lack of information about the biodiversity found in Bolivia, and over the last 10 years, these scientists found more than 8,500 species of plants, 144 of them new to science. The book begins and ends with an ethnobotanical look into how plants, when transformed into paper, are used by different cultures for creating art. This book in itself is an example of that, and concludes with a sampling of handmade papers from around the world, collected by ethnobotanist James Lucas, and made for the purpose of origami.
The history of landscape painting is in many ways a projective one—artists have labored for centuries in search of something elemental in light and color, and society has always appreciated those works through the lens of manifest destiny, their transformation of the banal, or their manufacture of the exotic. As such, landscape paintings are inescapably tied to the sociocultural mores of their time, and the resulting artwork almost always exists as a sort of armature or bridge between the world as it is, and as we desire it to be. Much of art does this, but landscape painting does so with unparalleled directness. Upon being approached for this exhibition, interdisciplinary artist, designer, and papermaker Michael Powell sought to explore how the landscape of the Missouri Botanical Garden might become the foundation of a more contemporary form of landscape painting. Whereas in centuries past, painters would have stood level with the landscape; today’s optical context is broader; so Powell began to explore the landscape, from the perspective of aerial drones. This shift to the perspective of remote warfare and surveillance did not enhance the detail or broaden the view, but in fact blurred the separation between things, creating patterns where once there were details, making anonymous what once had been identifiable, and abstracting that which had been concrete.

Powell chose to focus on three distinct areas of the Garden: The Heckman Rock Garden north of the Climatron®, the Shields Hosta Garden, and the Cherbonnier English Woodland Garden. Beginning in late winter, he began taking weekly walks through those gardens, supplementing his observations with drone footage, satellite imagery, and other photographic sources. Using that research to develop color palettes and patterns, he then cast these paper pulp paintings.

The Linnaeus Clock

The Linnaeus Clock (installation view)
Michael Powell, 2019
Courtesy of the artist
But why paper pulp? A hallmark of painting is the application of a medium to an armature. Paint is applied to canvas or pigment is applied to paper. The medium becomes an inescapable middleman, and the true relationship—between us and the land—is lost. So, Powell has removed the canvas entirely. The paintings (100% paper pulp) are made from the land that they represent and thus are a direct translation—we experience them just like the drone experiences the Garden.
Owls
Beth Johnson
2019

feinlí/fenlí
Catherine Liu
2018

Cattleya (Orchidaceae)
Cekouat Elim León Peralta
2018

Encyclia cordigera (Orchidaceae)
Cekouat Elim León Peralta
2018

Psychopsis krameriana (Orchidaceae)
Cekouat Elim León Peralta
2019

Dendrophylax lindernii (Orchidaceae)
Cekouat Elim León Peralta
2019

Megasoma elephas
Cekouat Elim León Peralta
2019

Dynastes neptunus
Cekouat Elim León Peralta
2014

Phyllium philippinicum
Cekouat Elim León Peralta
2019

Choerodosis rhomboidea
Cekouat Elim León Peralta
2018

Rhambodera latipronotum
Cekouat Elim León Peralta
2017

Tender Blue
Isabella Myers
2017

Kuehneosaurus
Jon Tucker
2012

Camel Cricket
Jon Tucker
2015

Plant Transformations, Observations and Interactions
Megan Singleton
2018-19

Collection Site: Lake 34: 1
Megan Singleton
2016

Collection Site: Lake 34: 2
Megan Singleton
2016

Collection Site: Lake 34: 3
Megan Singleton
2016

Collection Site: Lake 34: 4
Megan Singleton
2016

Collection Site: Lake 34: 5
Megan Singleton
2016

Nekumbonaceae
Megan Singleton
2016

Blue Square
Nguyễn Quyết Tiến
2018

HydRingEa
Nguyễn Quyết Tiến
2018

Sparrow
Rob Snyder
2016

Polar Bear
Rob Snyder
2019

Gorilla
Rob Snyder
2016

Five-fold Two-layer Weave
Robert Lang
2014

Armadil, Opus 623
Robert Lang
2012

Model for Shirt Books
Shoko Nakamura
2018

Simple Dragon
Shuki Kato
2017

Kudu
Shuki Kato
2016

Grizzly
Shuki Kato
2018

The Hosta Garden – Spring
(Michael Powell)
2019

The Hosta Garden – Spring Night
(Michael Powell)
2019

The English Woodland Garden – Spring
(Michael Powell)
2019

Kintana
James Lucas
2014

Bactrian Camel
James Lucas
2017

Jacana
James Lucas
2009

Tuliptree Leaf
James Lucas
2018

Kangaroo Rat
James Lucas
2017

Compound of Dodecahedron and Great Dodecahedron
James Lucas
2019
Travel desk (American)
Rosewood, black inlay, mother-of-pearl, fabric, metal
Collection of Tower Grove House
[1962.2.103]

Interior Back Cover:
The Linnaeus Clock (detail)
Michael Powell, 2019
Courtesy of the artist

Cover: Bactrian Camel (unfolded)
James Lucas
2017
Courtesy of the artist