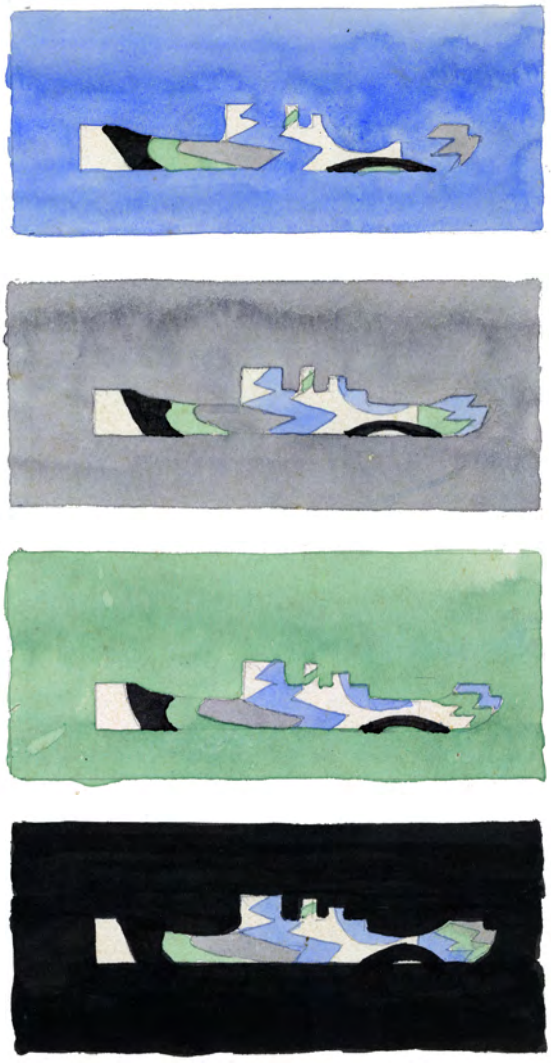
ABBOTT HANDERSON THAYER

A Beautiful Law of Nature



ABBOTT HANDERSON THAYER

A Beautiful Law of Nature

Ari Post

www.AbbottThayer.com

Published by Gold Leaf Studios

Rear-1523 22nd Street NW
Washington, DC 20037
www.GoldLeafStudios.com

Abbott Handerson Thayer: A Beautiful Law of Nature
www.AbbottThayer.com

John Plunket, *Director*
Ari Post, *Editor, Artistic Director*
William Adair, *Project Coordinator*

ISBN 978-0-9888976-0-1 Paperback

Updated Second Edition

First published February 2013

Printed in the United States of America through McClain Printing Company

Front cover: Detail of *Study of Ships with Five Colors*, ca. 1910

Unless otherwise indicated, all illustrations are by Abbott Handerson Thayer, from the Family and Estate of Abbott Handerson Thayer.

Contents

Preface & Acknowledgments

Reading the essays, articles and letters of Abbott Handerson Thayer is a demanding experience. He was easily excited by his work and research, and his sentences turned wildly impressionistic and tangential as he became intoxicated by the monumental implications of his ideas. As a result, his acute and brilliant observations on wildlife and artistry often lay concealed in a forest of verbose and sensational prose. Once, in declaring his revelatory Concealing Coloration theories of natural animal cam-ouflage, he insisted that, “The laws of color-correlation, are of course the very axis of the art of coloring, and any intellectual painter inevitably is scientist of all that is knowable in this matter.”

But Thayer wielded his words and ideas with the same qualities that made him the revered painter that he became. He had a distinct character and sharp intelligence, an eye towards the transcendental, and a Renaissance-like passion for innovation in all fields of art and science. A deeper look into his legacy of artistic and interdisciplinary accomplishments dispels any doubt upon his riveting and infectious genius.

In cataloguing and exploring this collection of Thayer’s later work, it is remarkable to watch his oscillating focus between visual art and wildlife research coalesce into an unprecedented breakthrough: the conceptualizing of military camouflage. With Europe and the United States on the cusp of the First World War, Thayer pioneered a significant new role for visual art in the welfare of modern society. There is little doubt that his innovations in camouflage led to the sparing of soldiers’ lives. While obscured by controversy and skepticism that was inflicted in part by his own antisocial and disagreeable nature, Thayer is increasingly regaining distinction as a groundbreaking artist, naturalist, and "the father of camouflage."

A special thanks must go to Jean Reasoner Plunket, granddaughter of Abbott Handerson Thayer, and her children John Plunket, Kathy Plunket Versluys, Liz Plunket Riviera, and Peg Plunket Hyland, for assisting with this exhibit and upholding Thayer’s legacy. A debt of gratitude is due to the curators of the Smithsonian Institution’s many archives and galleries who so generously allowed us access to their collections. Our appreciation also extends to Susan Hobbs and Lee Glazer for their longstanding advice and encouragement, and to Richard Meryman, whose father was mentored by Thayer, for his invaluable assistance. Lastly, thanks to Roy Behrens for his collaboration and guidance. This catalog is dedicated to the memory of Richard Murray.

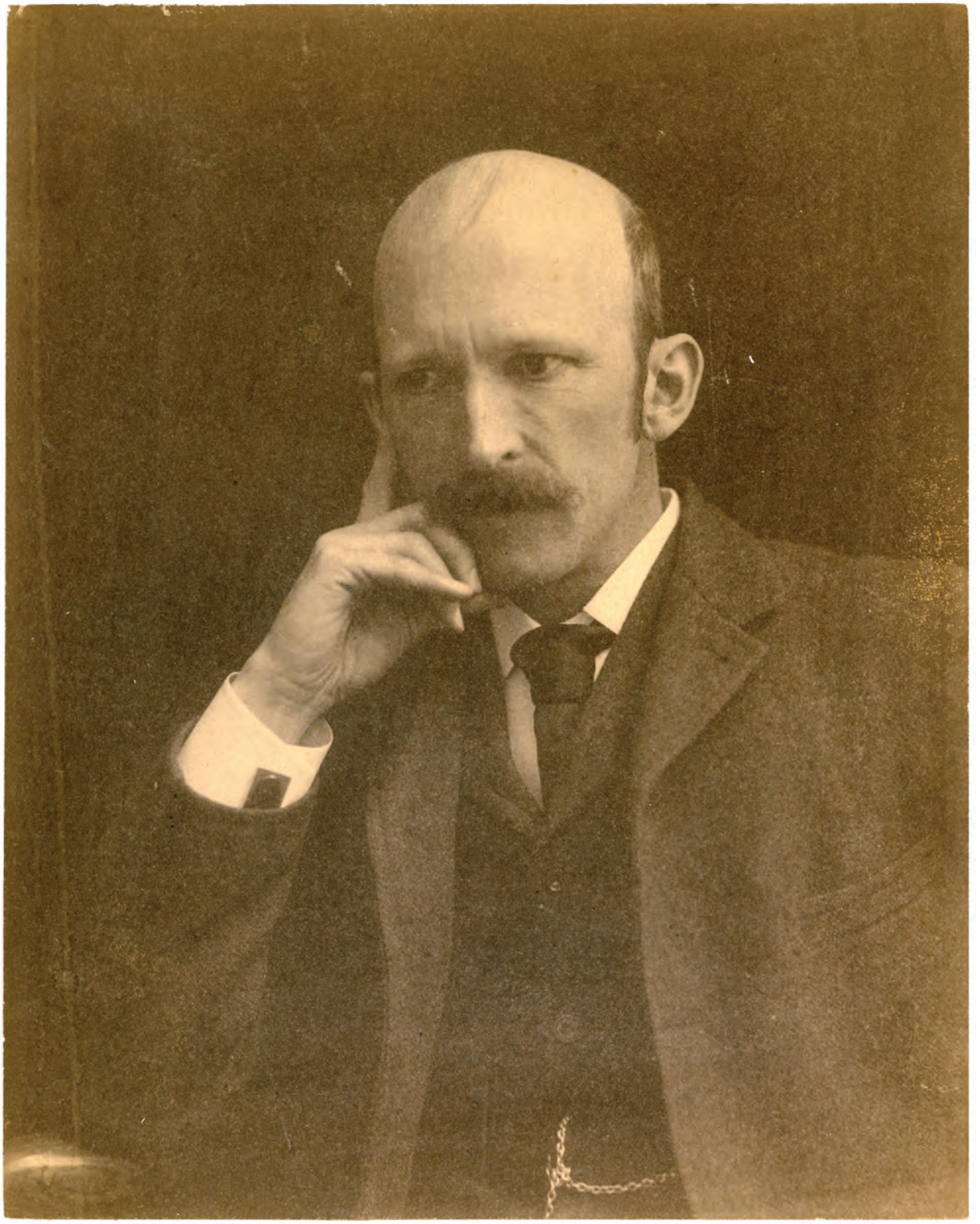
Ari Post
Editor

"All colors and designs on animals are pure art, taking the lead...of all human performance. Each bird's or beast's costume is pure scenery."

Abbott Handerson Thayer
Camou age, The Scienti c Monthly, Vol. 7 (December 1918)

"Nature served as the family's religion through groves of spruce and hemlock... mysteries of the mountain brook."

Barry Faulkner (1881-1966)
Painter, WWI enlisted camou eur, cousin and student of
Abbott Thayer, on life with the Thayer family.



INTRODUCTION

The Life and Work of Abbott Handerson Thayer

Abbott Handerson Thayer (1849-1921) was an important American artist in the last quarter of the nineteenth century, and his paintings were commissioned by some of the foremost art collectors in the United States. He was also a lifelong wildlife advocate whose artistic focus never strayed far from his personal fascination with the natural world. In the 1890s, he began to publish articles in scienti c journals on his developing theory of protective coloration. Through observing wildlife, he discovered that the coats of many animals employ color patterns that conceal them in their natural environments. He noticed, for instance, that the ecked coloring of woodland birds resembles the dappled e ect of sunlight seen through branches and leaves. Plumage, according to Thayer, "is a sort of patchwork of pictures, subtly intermingled, each an epitome of some particular type or detail of woodland scenery." He called this phenomenon a "beautiful law of nature."

At the outset of World War I, Thayer channeled his theories of concealing coloration—for which he had become widely recognized, in part because of a public debate surrounding the efficacy of his ideas—into concepts for early camou age design. He realized that human lives could be spared and protected by applying the perceptual tendencies he discovered in animal coloration to soldiers' uniforms, vehicles, ships and supplies. In the last twenty years of his life, Thayer combined his studies of art, natural science and camou age development into a remarkable and unprecedented oeuvre.

This important collection sheds new light on Thayer's achievements in the last decades of his life in a way that clearly demonstrates how his scienti c discoveries were informed and governed by an artistic vision. In an almost literal sense, Thayer saw nature and painting as one, and he employed them together in response to the needs that arose from the war.

Thayer arrived at camou age inadvertently, in the process of pursuing art. As a student, he had learned that any shape drawn on a at surface can be given volume and dimension by a venerable process called *shading*. This is reliably achieved by rendering the shape lighter on the top and gradually darker toward the bottom. As we know from current brain research, this takes advantage of an inborn visual tendency

Photograph of Abbott ayer
Family Archives

Title page of ayer's 1909 publication, with illustration of a male peacock concealed amidst native ora

The folded center page describes how the coloration of the bird's plumage is e ective as camou age, although it is far more commonly thought that a male peacock's elaborate tail feathers are principally for attracting a mate. Many of Thayer's invaluable and extensively validated contributions to the scholarship of camou age research were overshadowed by unfortunate discrepancies of lesser importance such as this one, which resulted in public debates that attracted criticism (see page 28).

called the *top-down lighting bias*: when we look at anything, we default to the assumption that its light source is coming from overhead.

It was Thayer's artistic experience that enabled him to realize why so many animals have light colored bellies with darker coloring toward the tops of their bodies. The e ect is the inverse of shading. Appropriately, it became known as *countershading*, because the e ect counteracts the shadows resulting from cast sunlight, making an animal look less dimensional, less solid, less "thing-like." Though some of Thayer's other proposals have been disregarded, countershading is a widely accepted biological principle today, and stands as the artist's most signi cant contribution to the natural sciences.

Spurred on by his meteoric success (initially scientists praised his work), Thayer redoubled his e orts to make even more startling scienti c discoveries about animal forms, devising ingenious demonstrations, mounting museum exhibits and publishing numerous scienti c papers to showcase his ndings. In 1909, prior to WWI, he and his son Gerald published a masterful volume titled *Concealing Coloration in the Animal Kingdom: An Exposition of the*

Laws of Disguise rough Color and Pattern: Being a Summary of Abbott H. ayer's Discoveries, which is arguably the most innovative and thought-provoking treatise on natural camou age to this day. When war broke out, it was largely because of Thayer's writings that French, British and American camou age units were formed for the rst time in history, with hundreds of artists, designers and architects (a few of his students among them) serving as camou age specialists, known as *camou eurs*.

Having written extensively on Thayer, art and camou age for four decades, I nd the most exciting part of this exhibition the inclusion of studies and mock-ups that demonstrate Thayer's application of his animal coloration theories to wartime camou age. These include dioramic backgrounds with cutout gures of soldiers, not unlike paper dolls, in disruptively painted eld service uniforms, and stencil-like silhouettes of soldiers that can be repositioned from one background to another. There are also a number of small-scale watercolor studies of so-called "dazzle" patterns applied to the sides of ships. To my knowledge, few if any of these artifacts have ever been exhibited.

This catalog's essay by Martin Stevens affirms that Thayer's camou age theories have been "increasingly validated through scienti c testing." However, there will always be an imbalance between scienti c discovery and artistic exploration, as one is attributed with the process and precision of logic and the other mythologized by the arcane, anagogic nature of creativity. So, perhaps as a consequence of Thayer's quixotic temperament, combined with his admission of manic-depressive tendencies (he wrote of his extreme mood swings between "all-wellity" and "sick disgust"), the validity of his pronouncements may always be doubted in some circles. Looking back nearly a century later, it is clear that he was doubtlessly balky and eccentric, but equally ahead of his time. Even his son Gerald, in an essay published two years after his father's death, admitted that Thayer, "who now stands, both in this country and Europe, as the extreme believer, or over-believer, in protective coloration in nature is, to my mind, at once an unequalled expert and an extremist."

Roy R. Behrens
Professor of Art and Distinguished Scholar
University of Northern Iowa

Mr. Behrens teaches graphic design and design history. He has written extensively on art and camou age, and maintains a blog on the subject at www.camoupedia.blogspot.com.

ABBOTT HANDERSON THAYER

Figures, Landscape, and Camouflage

The title of this essay suggests three distinct subjects in Abbott Thayer's art, the best known of which today is surely gure painting. His highly regarded portraits were an important source of income, but it is his ideal female gures, singly or accompanied by children, that are most closely associated with his name. However, Thayer's art is more diverse and rich than that suggests, and in his own day his collectors equally valued his landscapes. As a landscape painter Thayer stands in an altogether di erent light—the outdoor light where he painted the un-peopled countryside he loved. There is also the specialized category of camou age paintings, often demonstration pieces that were derived from his acute quasi-scienti c observations in nature, and which he then applied to military camou- age. While nearly lost to history, his admirers could not have been ignorant of this mostly non-commercial third subject, with which he was increasingly preoccupied for the last three decades of his life.

Since Abbott Thayer's art is viewed incompletely today, it may help to begin with the subject of camou age and then relate it to his other painting subjects. It developed from his independent observations on *protective coloration* in nature, beginning in 1892 and published in an 1896 paper where he demonstrated the principle of *countershading*; animal coloration, he observed, was usually darker where lit by the sun and lighter in shadow, visually canceling the e ects of shadow and making animals less visible and better concealed in their natural environment. *Concealing coloration* and his related theory and demonstration of *disruptive coloration*, which disrupts the animal's body outline to further meld with its surroundings, led to Thayer's proposals for e ective military camou age both for uniforms and for warships.

This profound absorption in the rhythms and aesthetics of nature raises key questions: Why was Thayer so deeply involved with the natural world, and how did it a ect his art? He was raised in Keene, New Hampshire, near Mount Monadnock, a region he was drawn back to throughout his life despite nearly twenty years of study and work in New York and Paris. As a child his earliest paintings were watercolors of animals, and he was a trapper and a "bird crazy" student of *Audubon's Birds of America*. His bedrock ideal was Transcendental-

Winter, Monadnock, ca. 1900

Watercolor, gouache, chalk, and pencil on paperboard

20 x 16 ⅜ in.

Smithsonian American Art Museum, Gift of John Gellatly

ism—God's immanence in nature—and it was almost innate, confirmed by Emerson's ardent affirmation that "within these plantations of God . . . the currents of the Universal Being circulate through me." That he would paint the New England landscape was inevitable.

Thayer's early training in New York at the Brooklyn Art School and the National Academy of Design was followed by four years of study in Paris and travel in France and Germany. In 1879, at the age of 30, he settled in New York City, where he developed a notable reputation among his fellow artists, and by 1883 he was chosen president of the Society of American Artists.

During these same years, however, the death of two infant sons and the onset of his wife Kate's illness (diagnosed as melancholia, but recently speculated as tuberculosis) and her subsequent commitment to a sanatorium were more critical in determining Thayer's later personal and artistic path. He himself suffered from debilitating mood swings (he called it "the Abbott pendulum") and, although it is unclear how early he experienced them, they must have intensified his gradual withdrawal from urban society. After his wife died in 1891, he married Emma Beach, a close friend and personal advisor to the family, who had been caring for the Thayer children since Kate fell ill. In 1901 Abbott and Emma moved to a rural retreat near Dublin, New Hampshire, in the very shadow of his beloved Mount Monadnock.

His retreat to this rigorous environment also had a physical motivation. Tuberculosis, recently identified as a disease, was feared (Thayer was afflicted by "oceans of hypochondria"), and the accepted treatment was fresh mountain air. The entire Thayer family now lived in an uninsulated house with no electricity, running water or indoor privy, and no heat other than fireplaces and wood stoves. In fact, the family habitually slept outdoors year-round in simple lean-tos erected in the woods surrounding the house.

As a landscape painter Thayer's feeling for simplified design is striking. Working out of doors, the spare élan of his brushwork in many of these works is consonant with the unbroken snowfields and crisp bare wintry branches that are common in his Monadnock paintings. It is typically expressive, masterfully adapted to the varied subjects, and Thayer expertly recreates the natural light of each place. In his excellent landscape watercolors, Thayer's calligraphic brushwork is memorable. It should go without saying that his study of animal coloration, and the conclusions that he drew from it, went hand in hand with his landscape painting excursions.

Winter, Monadnock (page 14) is a watercolor with gouache and chalk painted circa 1900. It is a casual view of scattered trees in the

Blue Jays in Winter, study for book *Concealing Coloration in the Animal Kingdom*, ca. 1905-09

Oil on canvas

22 x 18 in.

Smithsonian American Art Museum, Gift of the heirs of Abbott Handerson Thayer

My Children (Mary, Gerald, and Gladys ayer), ca. 1897

Oil on canvas

86 x 61 in.

Smithsonian American Art Museum, Gift of John Gellatly

snow at the edge of a swampy gray-brown forest. There is no sky, but the forest at the top of the picture is a backdrop for the sparse green foliage of the foreground. The pervasive aura of the painting, however, resides in the blue shadows that dapple the snow in impulsive, expressive patches and extensions held in their place by scattered sketchy dark strokes evoking barren bush limbs. The brush moves in quick, independent strokes that often change direction. The ceaseless movement of the shadows suggests not just forest shadows (sometimes even footprints) but cloud shadows and even wing-shapes. These blue forest murmurs are suggestive and evocative, not literally representative.

Blue Jays in Winter (page 17) is a study for *Concealing Coloration in the Animal Kingdom* (the book written by Abbott Thayer and his son Gerald). It is quite comparable to *Winter, Monadnock* but it is a didactic piece that shows the blue jays on a foreground bush where the violet blue of the jays blends with the same hue of the shadows on the snow making parts of the jays largely "invisible" against the snow, unrecognizable to the eye of the predator. Their beaks, black throats, and even the small black feathers in their tails mimic the thin branches or the short shadows on the snow. Here Thayer includes the blue sky and its scudding cloud patterns as a distant variation on the main theme. Perhaps that passage has no relation to camou age theory but might subconsciously bolster Thayer's demonstration for the viewer. One might accept the theory, Q.E.D., while relishing the allusive poetry of the earlier watercolor.

Finally we can look at one of Thayer's ideal gure paintings made during the last decades of the 19th century, a period of nationalism that sparked the so-called "American Renaissance" in art. Many grand public buildings were being decorated with murals, mosaics, and sculpture, whose subjects were often classical allegories or personi - cations (of learning, law, the arts, and the like). Large projects were undertaken by teams of artists in the spirit, as it was understood, of the Italian Renaissance. Thayer had the tools but not the bent for such work.

He preferred veiled or indirect meanings in his own gure paintings, so his ideal women, though they might have wings, rarely had speci c classical referents. These often large paintings were given very elaborate carved and gilded Renaissance style frames (for more on Thayer's custom-designed frames, see *Framing and Camou age*, page 62).

One beautiful example of his gurative work is *My Children*. The individualized faces in this painting are expected here, but "his children"—for they were very much his—were also the distinctive models

A detail of *My Children (Mary, Gerald, and Gladys ayer)* shows the costume of Thayer's son Gerald optically woven into the background of the painting, obscuring the boundaries of foreground and background, subject and environment. Consideration of this painterly interaction strongly suggests the early in uence of Thayer's concealing coloration theories. Another remarkable aspect of this painting is that it foreshadows Thayer and Gerald's immersion less than a decade later in researching and writing *Concealing Coloration in the Animal Kingdom*.

Opposite: Thayer poses with a bust of Ralph Waldo Emerson outside his home near Dublin, New Hampshire. Thayer admired Emerson's writings on Transcendentalism, a philosophy which espoused his own belief in the underlying divinity of nature and humanity.

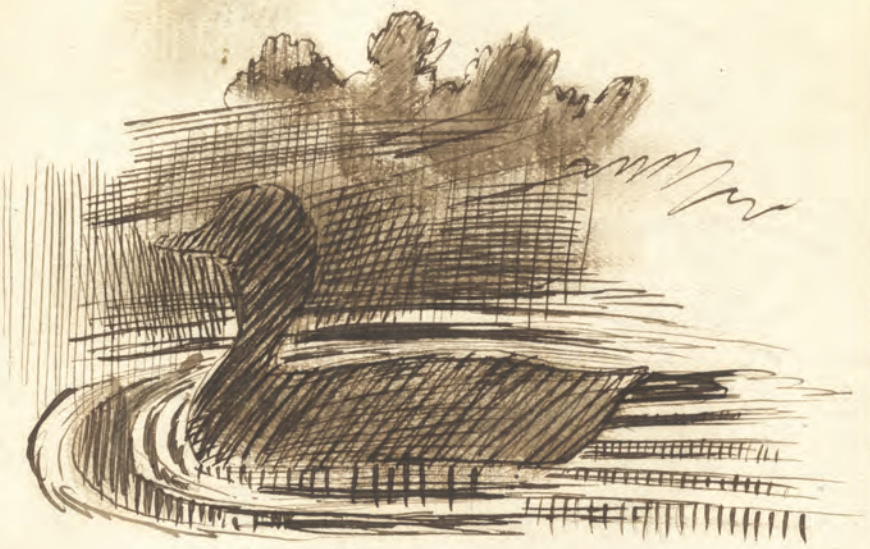
for unnamed gures in other paintings, which underscores the private, personal nature that connects many of Thayer's works from this period.

Since "ideal" in Thayer's art rarely means classical or religious imagery, it must be understood in terms of composition, pose, and elevated tone. Here the static, somber gures are frontal and symmetrically grouped, life-size and close to the viewer. Separate and unmoving, they look at us with quiet, even solemn expressions. The white gown with its greenish shadows is a bold central pillar that contrasts strongly with the anking dark earth colors (browns, ochres and dark greens) of the sketchily painted garments and the dark tree behind, all of which are improvisatorially brushed. Thayer's disinterest in smooth nish is distinctly modern, his style readily accepted by his patrons.

The boy's costume is fascinating, its uctuating complexity rendering its material and the surrounding dark grasses virtually indistinguishable. Our eyes do not readily di erentiate gure from ground. This bravura painting is intimately linked to Thayer's investigations of concealing coloration and his development of camou age. Abbott Thayer's subjects and style are uni ed by the eloquence of poetic ambiguity, which resonates in all his art, from gure painting to landscape to camou age.

William Kloss
Art Historian and Scholar

Mr. Kloss was an assistant professor of art history at the University of Virginia, and has enjoyed a long association with the Smithsonian Institution, presenting more than 150 courses in the United States and abroad on European and American art. He has also been a featured lecturer for the National Trust for Historic Preservation, and serves on the Committee for the Preservation of the White House, a presidential appointment he has held since 1990. The author acknowledges with gratitude his debt to the article by Richard S. Meryman, Jr., "Abbott Handerson Thayer (1849-1921)," Monadnock Art, Friends of the Dublin Art Colony, 2006, www.MonadnockArt.org.



a duck if he had no white pattern flat but silhouetting against the ripple - shines he makes. of course flat because of gradation

a wood duck, flat and further aided by his white pattern which seem to carry the ripple - shines across him as if you saw them to them

LOST AND FOUND

Abbott Thayer and the Study of Camouflage

Ten years ago, had you asked a random set of biologists working on animal coloration who Abbott Handerson Thayer was, few would have known. Many would have referred to the British zoologist Hugh Cott, the great Victorian naturalist Alfred Wallace, and the Oxford zoologist Edward Poulton as pioneers of the eld. While there is no doubt that those individuals are worthy of such recognition, until recently Thayer was largely disregarded. Today, things are very di erent. Most of Thayer's key theories have been validated by scienti c research over the last ten years, rightfully reinstalling him as the father of camou age.

At its essence, natural camou age is a strategy developed by many animal species to stay alive. For some, it is an anti-predator strategy, which hinders a predator in detecting its presence. For many predators, like the preying mantis, camou age allows them to spring upon their prey unnoticed. Some species like cuttle sh and chameleons can even change color depending on their environment. The principles of camou age have also found importance in human application, from the battle eld to the hiding of unattractive cell phone towers, and its study is therefore signi cant. As early as the turn of the 20th century, Thayer realized its potential.

Thayer proposed a great many ideas about animal coloration. Perhaps most importantly, he showed that camou age is not just about blending into the color and pattern of the surrounding environment, but also about breaking up form and destroying the e ect of shadows. He also made it clear that camou age is context dependent; an animal needs only to be camou aged at the time and place where it is at risk of detection.

He was well ahead of his time in many other ways as well. Thayer used photographs and practical demonstrations to show the e ectiveness of his ideas, rather than simply writing down his thoughts. His talent as a painter and a naturalist helped him greatly to depict how even bright color patches could blend and disappear into the natural environment. His demonstrations to other scientists and the public were similar to the types of displays that modern day scientists use to present their work to the public at events and museums. Interdisci-

Study of Two Ducks with notes by the artist, ca. 1890-1907

Ink on paper

5 x 8 in.

Two bird models, photograph for *Concealing Coloration in the Animal Kingdom*, ca. 1900-07

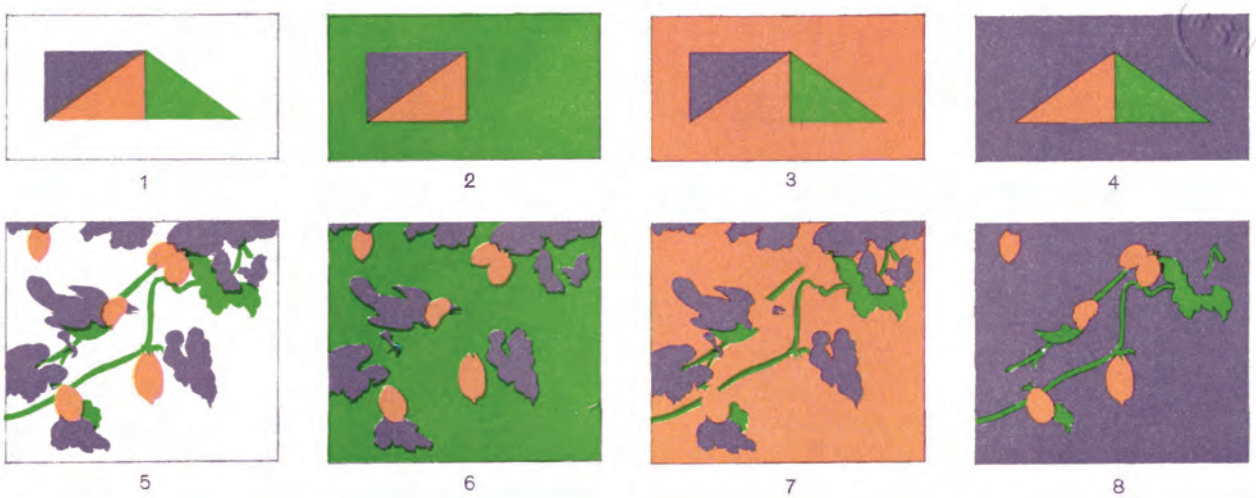
Thayer often presented objects with and without countershading to demonstrate how it could hide an animal. This photograph actually contains two model ducks: one without countershading, and the other (on the right, practically invisible) with countershading. Anticipating the reader's skepticism of the photograph's legitimacy, it is even written in the book that, "The reader will have to take it on faith that this is a genuine photograph."

plinary research is also common today, and indeed expected in many cases to bring about new discoveries, so it is a point of unique interest that Thayer's in uence spans zoology, art, and the military.

Thayer made three key contributions to understanding camou- age. The rst is usually called countershading, sometimes referred to as "Thayer's Principle." The theory of countershading is that animals are normally darker in color on the surface that receives most sunlight and lighter in the areas that receive the least. The e ect of this pattern, Thayer concluded, is to cancel out the shadow on the underside of the animal. Poulton rst suggested this idea in 1888 with regard to caterpillars, and also in his classic 1890 book *e Colours of Animals*.[2] However, it was independently proposed by Thayer as a "beautiful law of nature," and he extensively outlined and demonstrated its principles in a paper published in the *Auk* in 1896.[3]

Thayer further developed this theory in his book (written with his son Gerald) *Concealing Coloration in the Animal Kingdom* in 1909,[4] and demonstrated its principles with a wide range of photographs, paintings and personal exhibits in the US and Europe, illustrating how objects could "disappear" into the background when they were painted in such a way as to cancel out their shadow. Thayer met Poulton in the UK, and both parties were quick to credit each other with the discovery and shared a range of subsequent correspondence.

It was a remarkable discovery. Countershading as a form of coloration is a widespread phenomenon in nature. Numerous mammals, reptiles, birds, sh, and a variety of invertebrates, including species in both aquatic and terrestrial environments, have darker surfaces and



Tricolor contrast diagrams for *Concealing Coloration in the Animal Kingdom*, ca. 1900-07

These visual displays with simple shapes and contrasting colors were part of Thayer's studies to examine how birds and other animals can become indistinguishable against different backgrounds. Thayer was the first person to suggest that it was precisely the bold, contrasting patches of color on many animals' coats that rendered them so effectively camouflaged. Against varying natural backdrops, the contrasting patches of color would break up the outlines and shapes of the animals, blending them into their surrounding environments (as the bird silhouette on the cards indicates).

light undersides. Some species of fish even have bioluminescent light-producing organs on the underside of their body to cancel out downwelling light from above (known as counter-illumination). Nonetheless, it was not until scientific studies were conducted between 2004 and 2009 that countershading was shown to really enhance camouflage and hide prey animals from predators.

While there is still more to learn about this phenomenon, scientists today largely agree that countershading has two main benefits in camouflage. The first is to cancel out the shadow that an animal's body creates on its underside (self-shadow concealment), and the second is to destroy the animal's three-dimensional shape that would otherwise reveal it to a predator (obliterative shading; Thayer's original term for countershading). Both have the potential to make an animal, in Thayer's words, "cease to appear to exist at all."

The second major contribution Thayer made was his theory of disruptive coloration (referred to as 'ruptive' by Thayer). This idea argues that simply matching the background environment is not enough for an animal to remain hidden. Instead, it needs to destroy the appearance of its body outline. Thayer seems to have first written on this in 1903.[5] As with countershading, it seems that Poulton actually got there first by discussing ideas akin to disruption in his 1890 book. This was however only in a passing reference, and Thayer was the one who discussed this idea at great length, especially in his book.

Disruptive coloration seems to be found in a wide range of moths, ground-nesting birds like plovers, mammals such as okapi, and numerous fish. It rapidly became a textbook example of camouflage, despite the fact that it lacked any experimental proof. The theory had

to wait for validation until 2005, when research showed that disruptive patterns hinder bird predators in nding hidden arti cial "moth-like" targets in woodlands. A wide range of subsequent research has shown disruptive coloration to be an important and powerful method of concealment, and we now know how it works in fooling the visual processing of the predator.

Finally, many people are aware of Thayer's in uence and ideas in painting naval vessels during the rst and second world war with striking patterns of zigzags, stripes, and blocks of color. The most prominent idea here is that high contrast patterns make it difficult to judge the speed and trajectory of a moving object, termed motion dazzle (after "razzle-dazzle"). In nature, it would mean a predator would fail to attack at the right time to capture its prey. In war, this could mean an enemy targeter misjudging the direction and speed of a moving vessel at which it was ring. This style of ship painting became known as "dazzle painting." Many of these ideas seem to come from Thayer, as well as from the British painter Norman Wilkinson.

The success of the painting schemes is still debated, and it is even unclear exactly who came up with which ideas. Nonetheless, there are some accounts that suggest the patterns occasionally worked well enough to lead to accidental collisions between vessels.

With the end of World War II and the advent of technology like sonar, dazzle patterns disappeared and the ideas were largely forgotten. Recently, however, scientists have started to ask whether the patterns of animals may have a similar function, most notably the stripes and markings found on some butter ies and other insects, snakes and sh, especially those with stripes that live in shoals. The theory may even provide the answer to the age-old question of why zebra have stripes (and as a point of interest, the collective term for a group of zebra is a "dazzle").

In the last ve years, computer-based experiments using human subjects have shown that stripe and zigzag patterns can indeed make it difficult for us to judge speed and trajectory. It seems that the theory could work, but demonstrating proof in wild animals remains, understandably, quite challenging.

Thayer was a respected and well known artist when he died. But despite the general success of his idea of countershading and his in uence on military camou age, he failed to gain respect and appreciation from zoologists and naturalists for his ideas, or to be taken as seriously as he wanted for his military suggestions. So why were he and his ideas lost for so long from a subject he has taught us so much about?

Opposite page

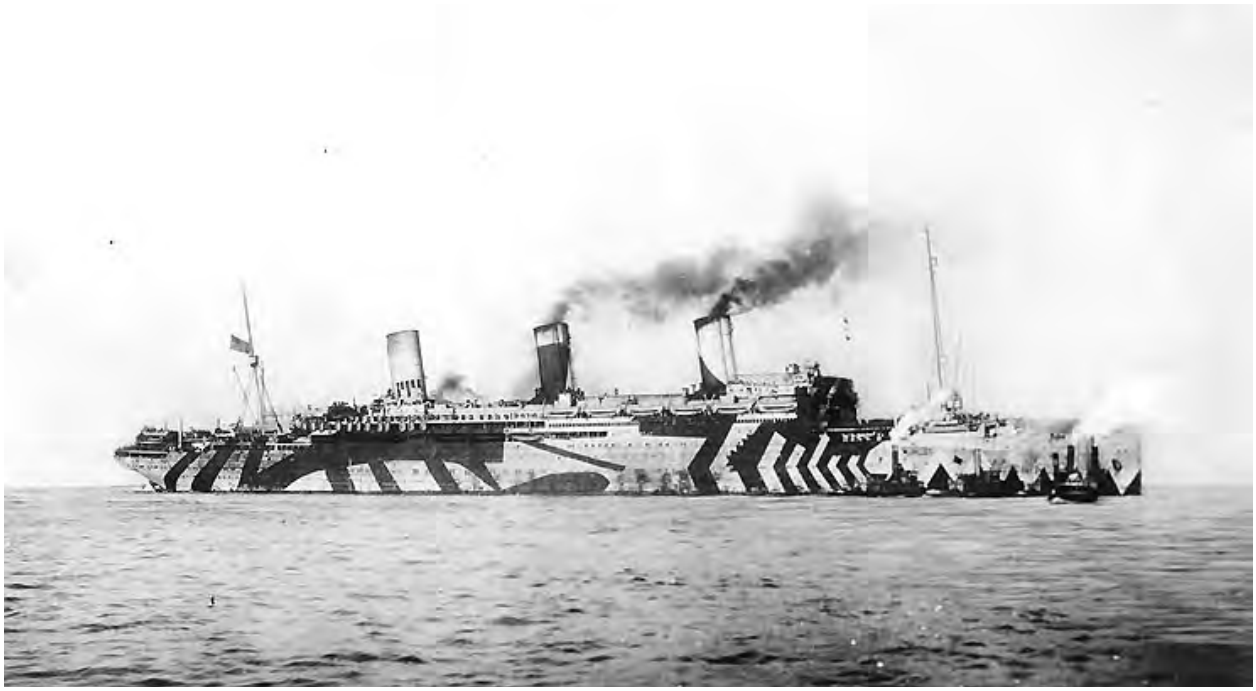
Top: *Study of Two Ships in Fog*, ca. 1910

Watercolor on paper

7 ½ x 11 ¾ in.

Bottom: USS *Leviathan* in harbor, painted with a dazzle camou age scheme, with tugs in attendance at her starboard bow, 1918

Photograph courtesy of U.S. Naval Historical Center (NH 71)



Study of Two Ships in Fog shows the e ects of dazzle camou age in low-visibility conditions. Inspired by the coloration of boldly striped animals like zebras and various birds, the intention of these patterns was not to make ships less visible, but to obscure their shape. This obfuscated their speed and direction in order to mislead torpedoes that were aimed by sight measurements during WWI. The Allied countries enlisted *camou eurs*, or camou age artists, to design patterns for the ships, like the USS Leviathan, pictured at bottom. Some of these *camou eurs* were students of Thayer (see page 54).

Thayer's 1909 publication *Concealing Coloration in the Animal Kingdom* drew attention to the importance of artistic principles in understanding animal and military camou age. However, as noted by the renowned British marine biologist Sir Alister Hardy (1896 – 1985) in a 1976 letter to Roy Behrens, "In parts of the book they let their imagination carry them away into some absurdities as when they think the colors of amingos help to make them inconspicuous against a sunset!" A series of defamatory controversies of this sort, and Thayer's difficulty dealing with the criticism it brought about—his arguments got him into widely published debates with retired President Theodore Roosevelt—resulted in the dismissal of his research in most biological and wildlife research communities.

Illustration plates of amingos and spoonbills against the morning and evening skies, for *Concealing Coloration in the Animal Kingdom*, ca. 1900-07

The problem for Thayer was that, despite his many wonderful theories, they were overshadowed by the unfortunate argument he made that all animals' coloration was used in concealment. Until recently, the most likely reason for hearing about Thayer would be in an undergraduate biology lecture; students would be shown Thayer's painting of a group of amingos, which he insisted were pink to be camou aged at sunset. We know however that amingos are not camou aged. They are seen as dark silhouettes against the setting sun and are strikingly visible throughout the rest of the day. The lecturer would use this as an example of how we need to be careful and rational in our thought process and look for evidence before accepting such ideas as true. Indeed, the case of pink amingos at sunset was latched onto by the famous American scientist Stephen J. Gould as an example of "illogic and unreason."[6]

Thayer had such a strong determination to validate his theories and refute his critics that he sometimes lost the ability to be critical of his own work, taking it to implausible extremes. This does not, however, detract from the fact that many of his theories are valuable contributions to natural history and science. His work is increasingly validated through scienti c testing as important principles in camou age.

Another mistake Thayer made was in his discourtesy to the scienti c community of his day. In 1909[4] Thayer writes in the introduction of *Concealing Coloration* that the eld of protective coloration has "been in the hands of the wrong custodians," and that "...it has naturally been considered part of the zoologists' province. But it properly belongs to the realm of pictorial art, and can be interpreted only by painters." This dismissal of biologists' contribution to the study of animal coloration, combined with his forceful, sometimes arrogant tone ("Our book presents, not theories, but revelations," he wrote), may well have conspired to put o many potential advocates of his theories.

Finally, perhaps due to a lack of formal scienti c background, Thayer did not always set out his arguments as clearly de ned theories and principles (with perhaps the exception of countershading, his most famous theory). He wrote about his ideas of dazzle and ruptive coloration in a continuous and informal prose that makes it hard to

fully appreciate the logic of his ideas and, perhaps more importantly, to make predictions from them.

In truth, Thayer's writing style may re ect the evolving understanding of motion dazzle and disruption, as modern day biologists continue to study these theories and the interrelation between similar concepts. Nonetheless, scientists like to classify and categorize theories in order to neatly test between them. This was something at which Hugh Cott excelled and is one of the reasons his 1940 book on animal coloration remained widely read, while Thayer's was all but lost. From 1940 until the 21st century camou age was largely left alone by the academic community, which no doubt also led to a loss of Thayer's ideas.

Today, however, camou age is a vibrant area of research. It is a truly interdisciplinary endeavour, studied by biologists, psychologists, computer scientists, military, and even engineers. Thayer's ideas have been rediscovered and, for the rst time, extensively tested. It is somewhat ironic that today he has much of the respect and admiration among scientists that he lacked in his own time.

As the design historian Roy Behrens writes in a paper about Thayer, published in a special issue of the *Philosophical Transactions of the Royal Society B* in 2009, which is entirely devoted to camou age: "During his lifetime, he would have needed 'no introduction' among serious artists and collectors, yet now ... he is largely unknown among artists, art students, and the American public. It is an odd turn of events that his achievements are far more familiar today among zoologists..."[7] Perhaps this is where Thayer would want his legacy after all, basking in the eld of scienti c recognition through his artistic and observational achievement.

Martin Stevens
BBSRC David Phillips Fellow
University of Exeter, UK

Dr. Stevens completed his PhD at the University of Bristol on bird vision and animal camou age. His current work focuses on sensory ecology and behavior, covering bird color vision, computational models of color and spatial vision, and anti-predator markings.

LAWS OF NATURE

Animals, Landscapes and Environmental Studies

Mount Monadnock, undated
Oil on board
14 ¾ x 22 in.
Collection of Robin B. Martin

The male wood duck was a recurring subject in Thayer's wildlife coloration studies, likely because its plumage displays a combination of notable camou age attributes, from countershading, to disruptive coloration, and elements of dazzle coloration. The animal is featured extensively in *Concealing Coloration in the Animal Kingdom*.

Thayer was also a compulsive revisionist, known to create numerous studies before executing a nal painting. The two *Wood Duck* paintings, above and at the bottom of page 33, are clearly preparatory studies for a nearly identical nal illustration that appears in his book (top of page 33).

In *Concealing Coloration*, Thayer notes, "The beautifully contrasted black-and-white bars on the anks of the Wood Duck are ripple pictures...in that they depict motion... A swimming duck leaves a spreading, wedge-shaped trail of curling ripples, very noticeable in quiet water, while shorter ripple-lines also roll out in front of the bird's breast... This is a very important factor of disguise among ducks, particularly those that inhabit quiet inland water."

Clockwise from page 32

Male Wood Duck in a Forest Pool I, study for *Concealing Coloration in the Animal Kingdom* ca. 1890-1905

Oil on board

32 x 34 in.

Illustration plates of male wood ducks for *Concealing Coloration in the Animal Kingdom*, ca. 1900-07

Male Wood Duck in a Forest Pool II, study for book *Concealing Coloration in the Animal Kingdom* ca. 1890-1905

Oil on board

19 ¾ x 19 ¾ in.

Top (left to right): *Field study photographs of a butter y, snipe and male wood duck superimposed over their natural environments,* ca. 1900

Bottom:
Left: *Butter y cutout*, ca. 1900
Watercolor on paper cutout
2 x 2 ¾ in.

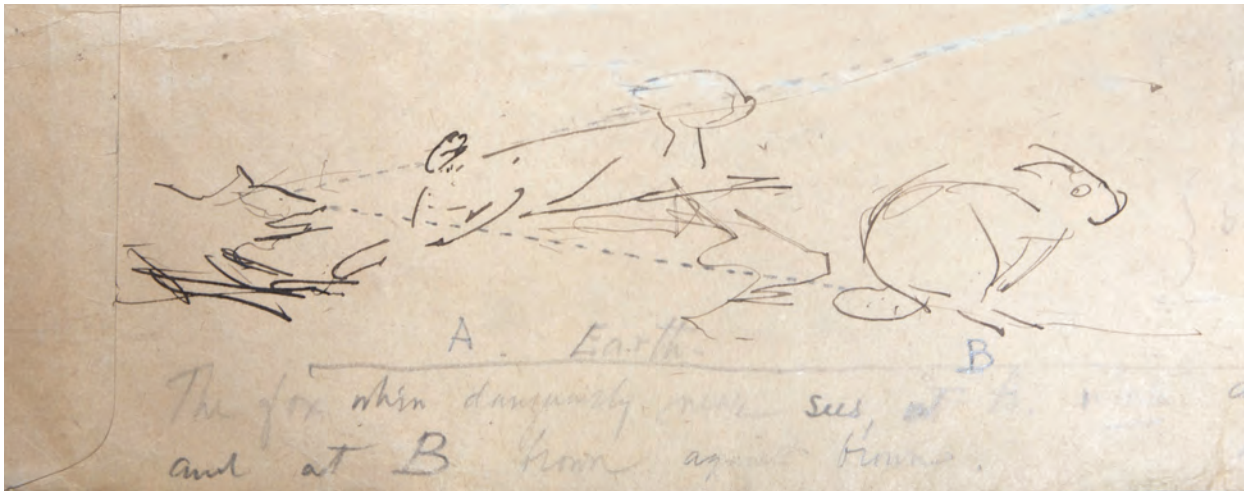
Right: *Duck cutout*, ca. 1900
Watercolor on paper cutout
1 ½ x 2 ½ in.

The cutout gures and stencils on this page demonstrate how Thayer experimented with various camou age theories to determine their e ectiveness, notably obliterative shading, countershading and dazzle patterns.

Thayer went far beyond producing paintings and illustrations to support his research of natural animal camou age. He frequently constructed elaborate ocular demonstrations concurrent with his ndings. For instance, along with his painting *Blue Jays in Winter* (page 17), in which Thayer painted the bird's plumage as an arrangement of the brilliant colors of sunlit winter scenery and its purple-gray shadows, he also devised optical tests made from simple cut paper and paint. First, he would cut a small hole in a piece of card paper, and on another he would paint a shade of blue that matched the plumage of a Blue Jay. A third sheet of paper would be left white to mimic snow, but Thayer would disrupt its light source, casting a shadow over the paper. When viewed through the small hole in the card paper, it was clear that the blue paint was indistinguishable in shade from the color made by the shadow cast on the white paper.

Other common tools he employed to test his theories were cutout gurines and silhouettes of animals, as seen in the photos above, which he would place amid the animals' natural settings. As demonstrated, Thayer was able to discern uncannily recognizable markings of many birds and animals by arranging his cutouts strategically before a precise spot in the natural landscape, such as with bird cutouts placed in front of reedy, brush-covered forest streams that mimicked the dappled, crosshatched color patterns of their plumage.

In the photograph on the left, strings are visible attached to a moth cutout placed against a tree, and the strings extend in di erent directions. This is one



Top: *Study of a Fox Preying on Two Rabbits, with Sight Lines to Indicate Visual Perspective of the Fox*, ca. 1900

Pencil on paper

5 x 7 ½ in.

Bottom: *Collection of Bird Cutouts of Various Species Commonly Found in the Northeastern United States*, ca. 1900

Mixed media on cut paper

Approx. 2 x 3 ½ in. (ea.)

These small bird cutouts, intricately detailed and slightly under life-size, showcase on the birds' plumage many of Thayer's Concealing Coloration principles, from obliterative shading to dazzle coloration and countershading. It is quite possible that Thayer used these models in nature, as he did with the butter y cutout on the opposite page, placing them in trees or other natural habitats to demonstrate the many forms and attributes of camou age.

of Thayer's live demonstrations or experiments, in which he would move the cutout around by pulling the strings, like a marionette, bringing its coloration and movement into relation with the colors and changes of its environment. This shows the moth from the perspective of other animals from which, whether as predators or prey, it would want to hide.

A remarkable example of this concept is found in the small sketch of the fox and rabbits above, scribbled quickly on the back of an envelope, which unveils the profound depth of Thayer's thought process in observing and contemplating wildlife. The drawing shows the artist considering the camou age e ectiveness of a rabbit, as it is observed from the perspective of its primary predator, the fox, which would view its prey parallel to the ground, as indicated by the dotted sight lines extending from the fox's eyes. Thayer was likely considering the cottontail rabbit, whose white rump and grey coat are, as Thayer might say, "beautifully obliterative" against skies and low-lying forest bramble.

Pro le of a Sparrow, ca. 1890-1907
Watercolor on paper
6 ½ x 8 ½ in.

Pro le of a Sparrow shows the loose, unfussy precision of Thayer's brushwork at the height of artistic maturity. The shape of the beak and contour of the head and neck are awlessly captured in a few quick strokes, while the body of the painting nears a euphoric state of abstraction—washes of sun-kissed earth tones, ecks of violet and deep blue, without real anatomical interest (he barely bothered to render the bird's eye). Thayer seems focused on capturing the essence of the bird's texture, plumage pattern, and shading.

Two years after Thayer's death, the modern sculptor Constantin Brâncusi, an important gure in early abstract art, would create the monumental sculpture *Bird in Space* (1923). Its lines and geometric harmony would concentrate similarly on distilling the shape of a bird's natural motion, attempting to capture "the essence of ight."

The color palette and composition of the sparrow matches that of *Withered Leaf*, suggesting that the two paintings were made around the same time.

Withered Leaf,
ca. 1890-1907
Watercolor on paper
6 x 5 in.

Given Thayer's wider focus on his book at the turn of the 20th century, it is more likely that he made them as a pair for a more detailed study to be nalized in *Concealing Coloration in the Animal Kingdom*, as with the caterpillar and oak leaf studies (page 38). Together, the paintings highlight Thayer's intention to consolidate and compare the hues and textures of wildlife coloration with their environments. Unlike more nalized works, these studies allow for an intimate look into the artist's process of observation.

The sketches above are eld studies for the nal illustrations in *Concealing Coloration in the Animal Kingdom* (below). Thayer's focus on the contour and body lines of the caterpillar, and how it conforms to the folds in the oak leaf, borders on abstraction in its un nalized state. Even in the nished version, however, the caterpillar nearly disappears into the curve and veins of the leaf. The description in the book reads: "In position, part of him passing for a continuation of the leaf on which he is feeding, and part of him for the underside of the same leaf."

Top Left: *Study of ree Leaves with Caterpillars*, ca. 1890-1907

Watercolor and pencil on paper

9 ½ x 8 in.

Top Right: *"Maple Leaf Edge Larva, Sketch,"* ca. 1890-1907

Watercolor and pencil on paper

7 ¾ x 5 in.

Bottom: Illustration plates of oak leaves and caterpillars for *Concealing Coloration in the Animal Kingdom*, ca. 1900-1907

Opposite Page: *Nature Study with Flora,* undated

Mixed media on paper

10 x 6 ¾ in.

Private Collection

Spring, Monadnock,
ca. 1900

Oil on canvas

21 x 17 in.

Landscape with Bare Tree,
ca. 1900

Oil on canvas

22 x 18 in.

Thayer was a subtle master of the painted landscape, and the rolling coastlines along the northeastern United States were perhaps his favorite subjects with the exception of his beloved Mount Monadnock. The receding shoreline above is a watercolor sketch of the coast along Nantucket, where the artist summered throughout the late nineteenth century. This view was from among his recurrent vantage points in the area, and yet it bears striking resemblance to his two paintings of the Cornish Headlands (both in the collection of the Smithsonian Institution). He painted those renowned works in St. Ives, England in 1898, while visiting his friend and fellow artist, Thomas Millie Dow (1848-1919).

Both of his Cornish Headland paintings were also observed from the same vantage point, overlooking the ocean with a succession of rocky promontories receding into the distance to the left. In a letter to his friend and frame designer Stanford White (see page 62) in 1906, he commented that they were among the "few things I've done that *I* love, and know to be something like great art."

Seascape (Nantucket), ca. 1890
Watercolor and pencil on paper
6 x 8 ¾ in.

Opposite: *Landscape Study*, ca. 1900
Watercolor on paper
13 ½ x 10 in.

Monadnock (verso of *Male Wood Duck in a Forest Pool I*, page 32), ca. 1890-1905

Oil on board

AN INVISIBLE ART

Early Camouflage Concepts for Military Uniforms and Navy Vessels

Detail: *Diorama for Military Uniform Camou age*, ca. 1910

Oil and collage on plywood

7 ½ x 23 ¾ in.

Top: *Diorama for Military Uniform Camou age*, ca. 1910

Mixed media on plywood

7 ½ x 23 ¾ in.

Private Collection

Bottom: *Cutout Figurine for Diorama*

4 ½ x 2 in.

As Roy Behrens (page 11) writes in the introduction to his book *Camoupedia*, "It was Thayer who blazed a conceptual path between military camou age and protective coloration in nature." From the o set of his research on animal coloration, Thayer was anxious to adapt his principles of camou age to the conditions of the battle eld.

Thayer put together a number of presentations to promote his ndings through the 1910s, creating interactive exhibits with optical tests and working dioramas (page 46-53). At one point, he even constructed a primitive camou age uniform, sewn together with discarded pieces of fabric (including his wife's stockings), which he posed in for photographs to illustrate its e ectiveness in the forest. In a 1918 article about military camou age, written three years before he died, Thayer argued for disruptively patterned sniper suits in place of the khaki eld service uniforms developed in the 1840s by the British, whose regulation red and white out ts created easy targets in the dusty terrain of India.

Thayer did so much to promote the usage of camou age that there is a mural in the New Hampshire State House of the artist demonstrating natural camou age principles to a group of young students. (The mural is by Barry Faulkner, the eminent American muralist and cousin to Thayer, with whom Faulkner studied painting and learned about camou age.)

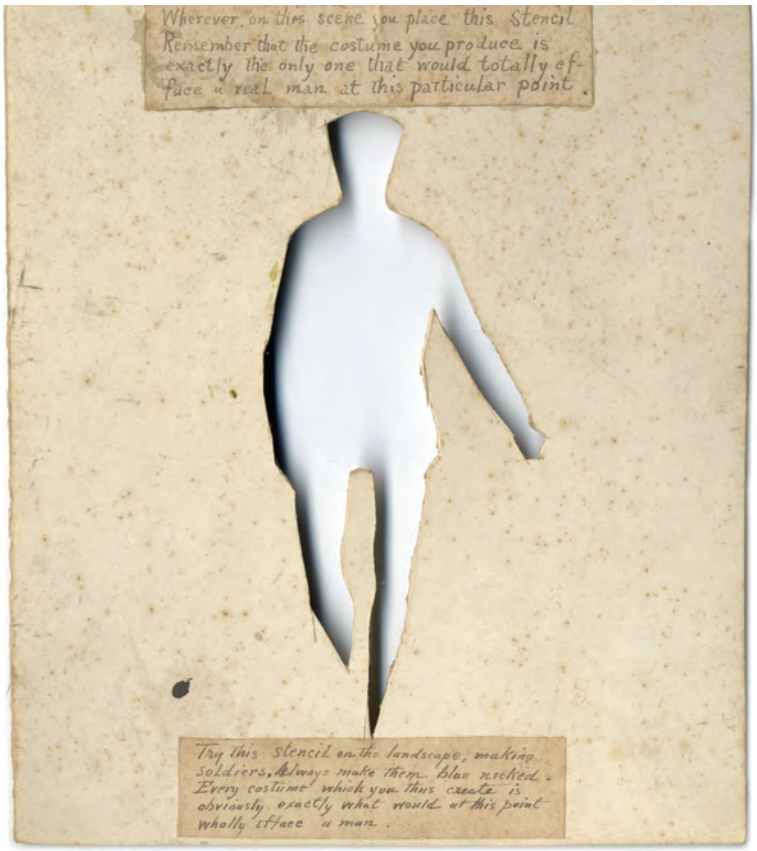
However, due to the scienti c communitiy's criticism of *Concealing Coloration in the Animal Kingdom*, Thayer

Top: Detail of the diorama shows stencil and gurine overlaid as the artist originally intended in order to promote his military camou age concepts. A small pinhole between the legs of the gurine shows how Thayer would tack it to the board for demonstrations.

Bottom: *Stencil for Diorama*

6 ⅝ x 5 ¾ in.

The notes on the stencil, which Thayer wrote by hand, are instructions for how to properly use and observe the diorama. It reads: "Wherever on this scene you place this stencil Remember that the costume you produce is exactly the only one that would totally efface a real man at this particular point. Try this stencil on the landscape, making soldiers. Always make them blue necked. Every costume which you thus create is obviously exactly what would at this point wholly efface a man."



spent just as much time in his later life trying to prove his theories to skeptical colleagues, among them former President Theodore Roosevelt.

Beginning with the mixed reception of his book, the end of Thayer's life was complicated by corresponding professional frustrations. He arranged to have fellow painter John Singer Sargent (1856-1925) present his camou age designs to the British War Office at the outbreak of WWI, but the project did not come together. He wrote many letters to military officials, including Franklin D. Roosevelt, then the Assistant Secretary of the Navy, urging them unsuccessfully to employ his camou age techniques in the battle eld. None of his direct e orts reached fruition, and the failure of his work to be widely accepted in his own lifetime left Thayer embittered.

It was largely agreed upon at the time that Thayer's ideas and intentions were noble, but that he took them too far, applied them too broadly, and exaggerated the nature of his ndings. As a result, his theories were never fully endorsed by the scienti c or military community. However, while he was personally unsuccessful in convincing Allied forces of the military utility of camou age, the matter was widely discussed and enough interest was generated to produce a second printing of Thayer's book in 1918.

There is no doubt that Thayer's e orts were integral in bringing the issue of camou age to the attention of the public and armed forces. By World War II, most military vessels were equipped with camou age patterns quite similar to Thayer's initial proposals from over twenty years before. And the term *camou age*, a niche term nearly unheard of in 19th century English parlance, was now a household word.

Triptych Diorama for Military Uniform Camou age, ca. 1910

Watercolor on matboard mounted to cardboard

8 ½ x 41 in.

Private Collection

Thayer went beyond designing coloration patterns in his research for military camou age; he made and modeled his own camou age suits, and created guidelines for the construction of camou aged service uniforms. In the right upper corner of the diorama on page 46, the collaged outline of an arm can be seen, and there is a di erence in the pattern and color. This was a pattern speci cally designed for the sleeve of a uniform. Thayer notes below the design that sleeves require unique patterning in order to more e ectively break up the contour of the human arm: " *is narrow strip of pattern is for making the sleeves, as shown in the stencil. is will give the pattern a spiral position on the sleeve."*

Top: *Translucent Layover for Triptych Diorama*, ca. 1910

Painted canvas-paper gures mounted to sheet plastic, sewn in a matboard sleeve

8 ½ x 13 ⅞ in.

Bottom: Two digital composites of Thayer's original diorama with layover, enhanced to achieve the artist's original intended e ect

The layover demonstrates the obfuscation of shape and proximity achieved by disruptive coloration patterns when viewing clusters of soldiers (or animals) from a distance. The rst ten gures on the left become almost impossible to discern.

Top: *Diorama for Military Camou age with informational panels*, ca. 1910

Mixed media on plywood

8 ½ x 33 ½ in.

Private Collection

Bottom: *Photographs of countershading light demonstration*, ca. 1910

Private Collection

Thayer frequently staged theatrical and interactive demonstrations to showcase his theories on the function of countershading as an e ective camou age principle. He became well known for being able to make a man disappear from view in plain sight with the ip of a switch. This "lightbox," which he set up in his studio to exhibit these effects, shows a man exposed by lights in the rst picture, and then all but vanished in the next, thanks to a carefully designed lighting setup. The faintest contour of a gure can be seen in the photograph to the right.

Thayer made many models of his working dioramas to correspond with both military uniform and natural animal camou age, which he and his son Gerald sent to various institutions around the country, such as natural history museums, in e orts to gain support and attention for the promotion of its usefulness. Each model came with hand-painted cutout gures and stencils (page 34 and 46), as well as miniature sewn uniform samples and detailed instructions for testing the e ects of the camou age. One model, pictured above, shows an exhibition-ready display, complete with instructional panels anking either end of the diorama. The instructions read:

By sliding these gures back and forth and studying them from a distance against di erent parts of the scene, the student can compare their relative conspicuousness. A monochrome costume like that of each of the Allies is only invisible when it stands against a monochrome expanse that is exactly as dark as itself. Its particular tint – be it that of French, English or German, makes practically no di erence.

e moment the background of a monochrome gure is either a little darker or a little

Camouflage First Studied From Nature Herself By American Painter

Over Twenty Years Ago Abbott H. Thayer Investigated Nature's Method of Protecting Her Wild Creatures—His Theory of White Sea Camouflage, Once Tried by U. S. Navy, Now Again Coming Into Favor.

By Will B. Johnstone

Left: *Newspaper headline, e Evening World Daily Magazine*, May 25, 1918

A major exhibit of Thayer's camou age paintings, drawings and interactive material was hosted at the home of Cornelius Vanderbilt in New York. The article discusses Thayer's attempts to persuade the American military to employ his camou age research to help conceal soldiers and naval ships in battle during WWI.

lighter, it stands revealed no matter what its tint.

Study also, against this scene from end to end, the soldier [gure] who is attached by a thread [page 46].

To minimise the visibility of the gures' shadow on the background (which of course in real nature would not be present) tack them to the background with a pin, if they refuse to lie close.

Place the picture exactly opposite the source of its illumination, and study it from exactly in front.

is miniature cap [not pictured] *illustrates the real cap, which will soon be sent you. It's front curtain, representing sky and foliage, can be reversed by pushing it up and back over the top of the head so as to convert the cap into a brown one.*

Right: *Filipino tribesmen in traditional tribal clothing and headdresses, with notes by Abbott ayer*, ca. 1910

6 ¾ x 10 in.

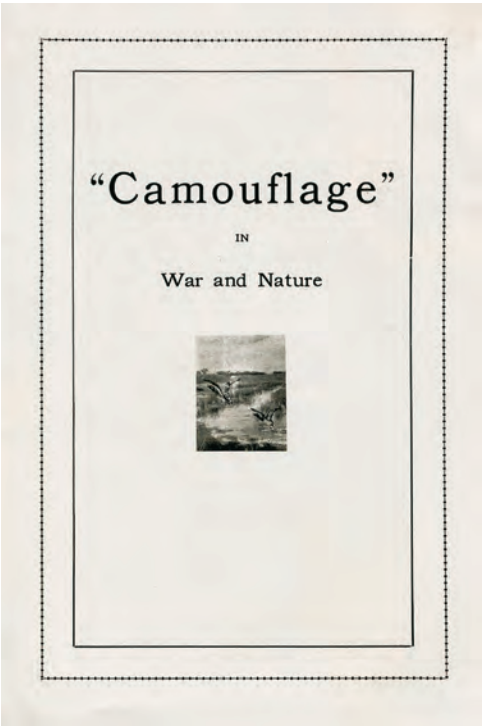
Private Collection

Thayer wrote that tribal cultures, notably in island nations, re ned their traditional clothing over generations, whether consciously or subconsciously, to re ect the native wildlife so as to better conceal themselves in their natural environments.

In his private studio in Dublin, New Hampshire, Thayer also performed elaborate lighting experiments to test his theories of countershading. There are numerous sources referencing his experiments in using arti cial lighting, with perfectly countershaded human and animal decoys, to make objects disappear in plain sight.

In the photograph at left on the opposite page, a human gure or decoy stands upright in a large box space, lit from underneath with stage lights. In the next photograph, the same space seems to be empty. However, the same gure is still present—vestiges of the hand supports are clearly visible and there seem to be ghostly textural clues within the zone of the gure—but this time it is lit with Thayer's strategic countershading lights. This is equivalent to Thayer's success in painting out the duck decoy in the photograph on page 24, in which he employed the same principles of countershading.

As Roy Behrens writes in his book *Camoupedia*, Thayer often used duck decoys carved from wood or cork when he demonstrated countershading, as he did in the spring of 1896 for Frank Chapman, editor of the American journal of ornithology *e Auk*. Chapman was evidently so persuaded by Thayer's demonstration that he published Thayer's rst article on the subject in the next issue of the journal. The article, titled *e Law Which Underlies Protective Coloration*, would become the springboard for Thayer's 1909 book, *Concealing Coloration in the Animal Kingdom*.



Thayer was also interested in making human gures disappear on stage for theatrical as well as educational purposes. The writer Nelson C. White, in his 1951 biography on Thayer titled *Abbott H. ayer: Painter and Naturalist*, writes that, "As late as the fall of 1905, his idea of making money from the principle of concealing coloration continued to distract Thayer, and we nd him still experimenting with life models in tights which he tried to make appear and disappear in lighted boxes..."

In fact, the public received Thayer's work and research with great interest, despite lagging military acknowledgment of his ndings. He soon gained a legion of supporters who helped him stage a number of exhibitions featuring his Concealing Coloration paintings, studies and interactive material of wildlife and military concepts.

One major exhibit in 1918 was hosted by the prominent New York art gallery M Knoedler Company and subsequently at the home of Cornelius Vanderbilt for the bene t of the Red Cross, which attracted wide attention according to The Evening World Daily Magazine in a review published on May 25, 1918 (see reprinted newspaper headline, page 51). The review reads:

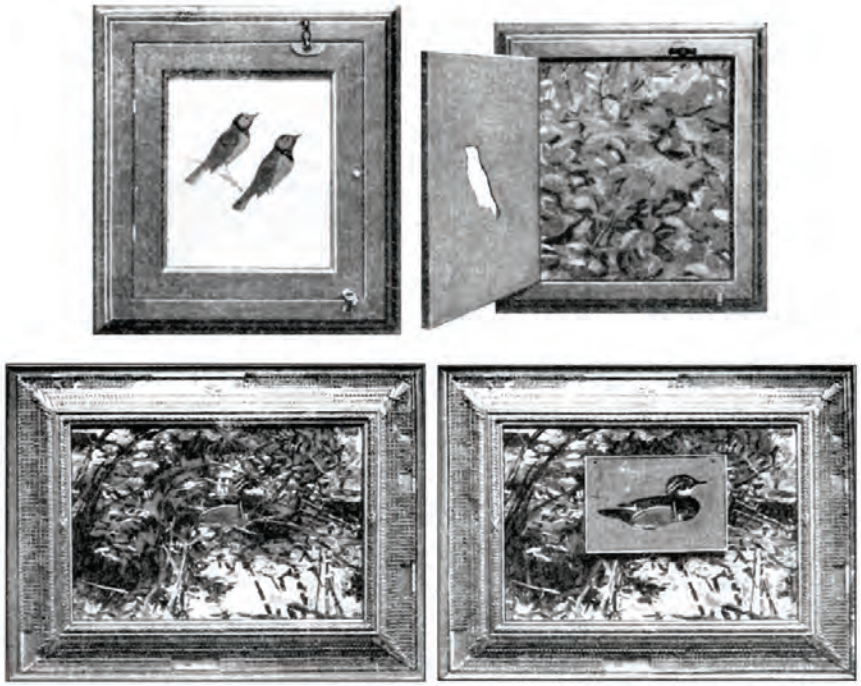
> *[Camou age] is the most celebrated word coined in the great war, will undoubtedly live in the dictionaries... Credit for the original idea and its development should rightfully go to...Abbott H. ayer.*

The article goes on to discuss Thayer's discovery of camou age principles through the study of wildlife, and then delves into the artist's suggested implementation of these designs on naval vessels and warships (see page 54–58), even o ering a slight to the American government for ignoring Thayer's achievements:

Left: *Brochure for Exhibit of Camou age Paintings and Studies at M Knoedler Company*, 1918

Right: *Informational pamphlet for " e Camou- age at Nature Invented: Studies from Mr. ayer's Interesting Exhibition at the Fifth Avenue Home of Mr. and Mrs. Cornelius Vanderbilt for e Red Cross*," 1918

These images are a selection of what was on display during Thayer's major exhibit of camou age work in his lifetime. Notice his reference to tribal clothing patterns in the tribesman at top center.



Framed studies for camou age exhibition at M Knoedler Company and the Home of Cornelius Vanderbilt, ca. 1918

The superimposed cutouts on the paintings were designed to help viewers nd the animals silhouetted within the paintings, where otherwise they were nearly impossible to see. The delicate, intricate grille panel frame on the bottom image suggests the importance that Thayer placed on framing his work to achieve its intended e ect (page 62). The raised grille is separated from the gilded back of the frame, creating a patchwork of light and shadows mimicking the painting.

Developing his discoveries in nature's countershading, he conceived the idea of applying the principle of 'low visibility' in a practical way for the protection of ships of war... He brought the matter to the attention of our Government, but received the usual encouragement…

e deadly submarine started our allies investigating the science of camou age and they are slowly coming around to Mr. ayer's point of view, and we are following suit. White is beginning to appear on the sides of our ships, together with black markings, to deceive the eyes as to the course of the ship when it is caught at close range.

The exhibit primarily featured paintings of animals concealed in their natural environments, and many had cut-out silhouettes for guests to superimpose over the paintings, revealing the location and markings of the animals.

In addition, prints were displayed of men and women from primitive island cultures in traditional headgear, attire and facial "war paint." Thayer asserted that each culture, whether consciously or subconsciously, designed their out ts to conform to their natural environments for greater success in hunting and self-preservation.

The photograph on page 51 is an example of his research into primitive tribal cultures. His notes underneath the photograph read: "These Philippinos are a good example of the aboriginal propensity to disguise the top outline of the head. Plumes like these obviously counterfeit jungle just as on the desert, Arabs' white [headdresses and robes] counterfeits sky and distance."

Thayer's numerous studies of Navy vessels explore the optical e ects of dazzle camou age. Inspired by the American slang *razzle dazzle*, meaning active confusion, Thayer is credited with rst using the phrase "dazzle" to describe the coloration of boldly striped animals like zebras, butter ies, and various birds and lizards. His 1909 book reads: "[Many] mammals and birds alike, have a few sharp black markings in their mainly immaculate white costumes. These evidently serve as what may be called 'distractive' or ' xed dazzling' marks."

Rather than making a ship less visible—a near impossible task in the open sea—the intention of dazzle coloration was to obscure its shape and structure, and to obfuscate its trajectory. During World War I, torpedoes were slow and had to be aimed not at the ship, but at its projected location, which was judged more or less by sight. Allied *camou eurs*, or enlisted camou age artists, appropriated the misleading shapes and vivid hues of dazzle coloration in their designs to make it difficult to determine the speed and direction of distant ships. Some of these camou eurs, such as Thayer's cousin Barry Faulkner and the renowned American painter Richard Meryman (who both served in the Camou age Corps in France), were Thayer's former students.

While the e ectiveness of dazzle patterns on ships was debated, its strategic functions became increasingly outmoded as more advanced technological tracking innovations like sonar were introduced to naval warfare. By the end of World War II, the practice of dazzle camou age on ships was all but obsolete. These drawings and watercolors by Thayer present dazzle camou age in some of its earliest forms.

Study of Dazzle Patterned Ship Against Mountains, ca. 1910

Watercolor on paper

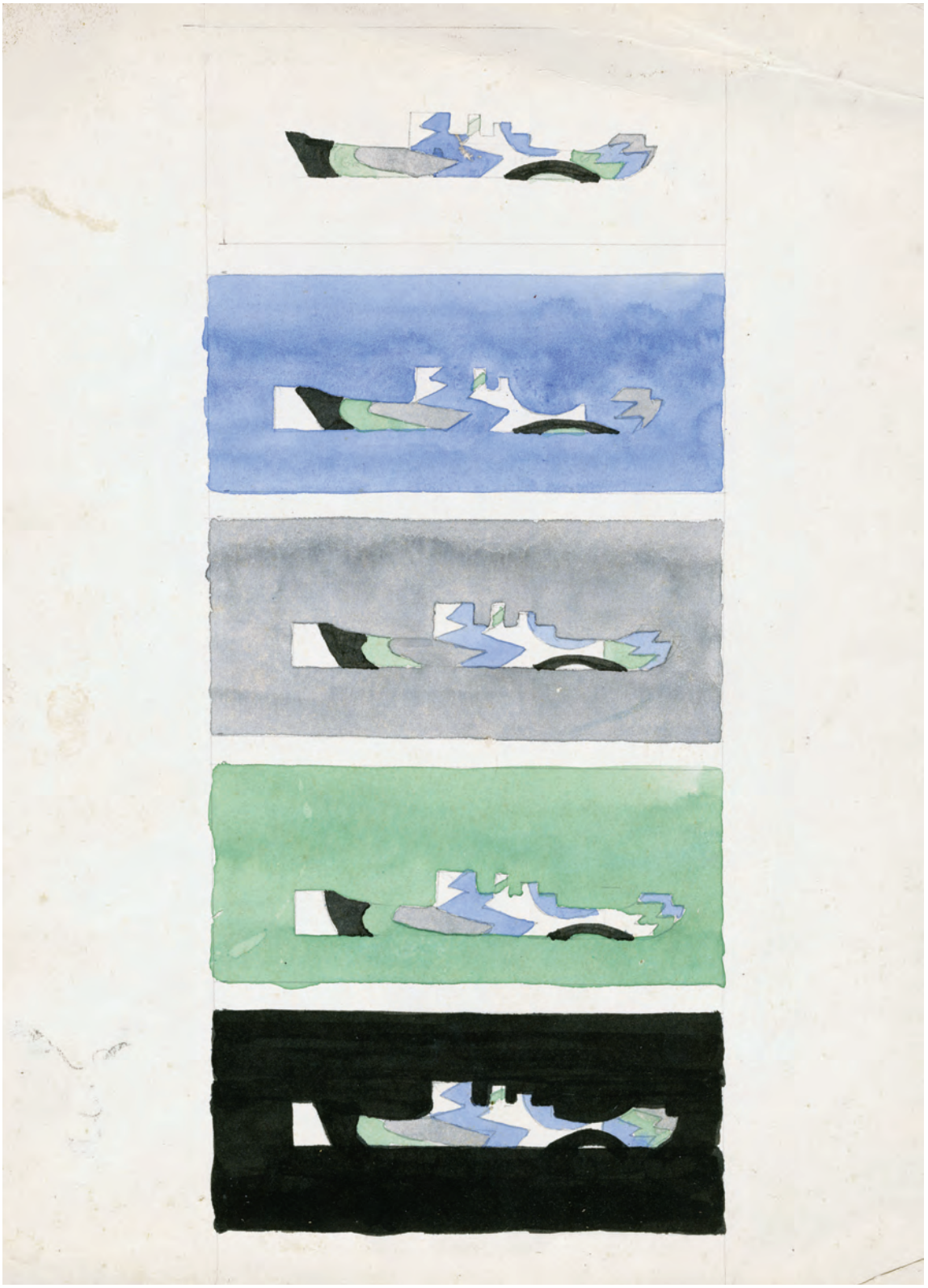
6 x 9 in.

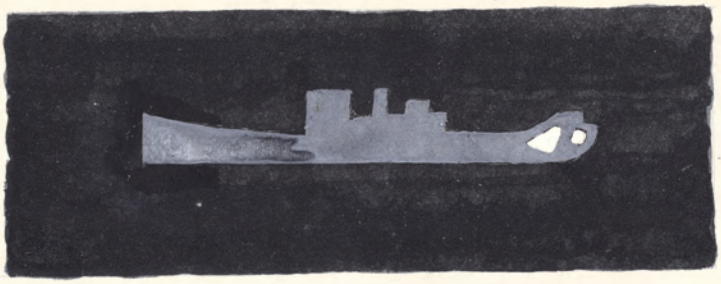
Opposite:
Study of Ships with Five Colors, ca. 1910

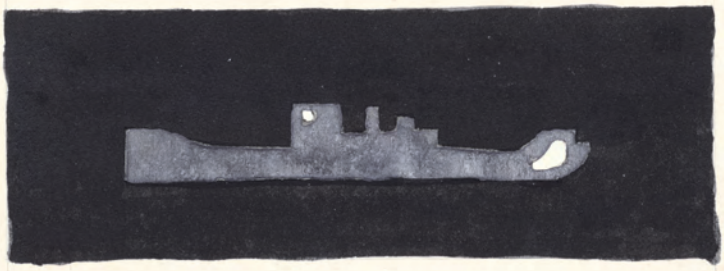
Watercolor on paper

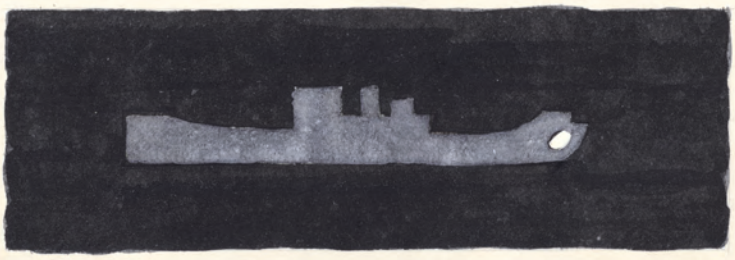
11 ½ x 8 ¾ in.

It is likely that the varying background colors Thayer used here were meant to illustrate the dazzle pattern's e ects in varying conditions of weather and geography: sunny, tropical, cloudy, and so forth.









Study of Four Ships on the Horizon, ca. 1910

Watercolor on paper

8 ½ x 11 ¾ in.

Opposite: *Study of ree Ships on Black*, ca. 1910

Watercolor on paper

11 ½ x 8 ¾ in.

Top: *Camou age Study for Ships I*, ca. 1910

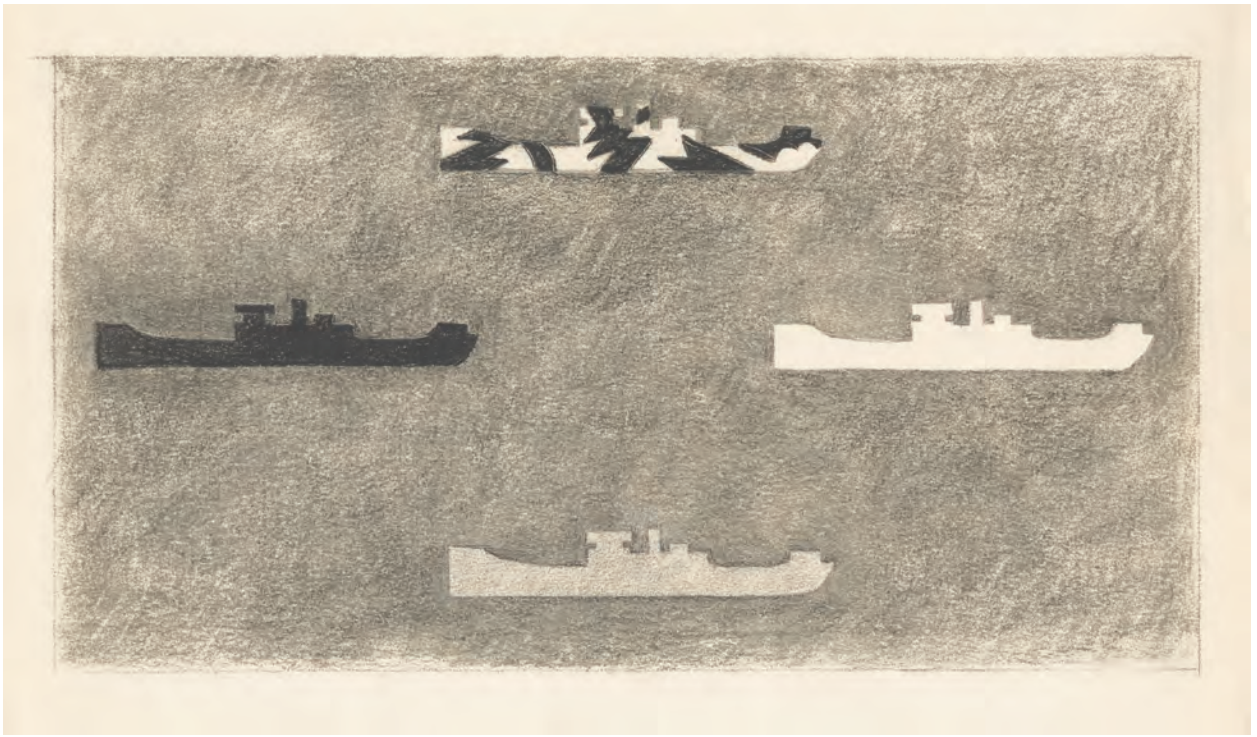
Watercolor on paper

8 ¾ x 11 ¾ in.

Camou age Study for Ships II, ca. 1910

Graphite on paper

8 ¾ x 11 ¾ in.



A LIFETIME OF WONDER

Art and Nature as a Childhood Pursuit

It was in pursuit of nature that Thayer produced his first artistic efforts. Born in 1849 in Boston, Massachusetts, young Abbott took an early interest in wildlife when his physician father moved the family to rural Keene, New Hampshire in 1856. According to his personal journals, he was particularly interested in wildfowl, routinely observing their habits, collecting eggs, studying *Audubon's Birds of America*, and sketching the birds and animals that so intrigued him.

As evidenced by *Study of Bird Eggs* (page 61), the young Thayer had an unusual fascination with natural patterns and textures that would prove integral to his work a half-century later. His book *Concealing Coloration in the Animal Kingdom* was not just a ten-year project, but a lifelong pursuit of truth in nature.

Peacock, ca. 1870
Pencil on paper
8 x 10 in.

Porcupine, ca. 1870
Pencil on paper
9 ½ x 7 ¾ in.

Top: *Study of Bird Eggs*, ca. 1860

Watercolor and pencil on paper

5 ½ x 8 ¾ in.

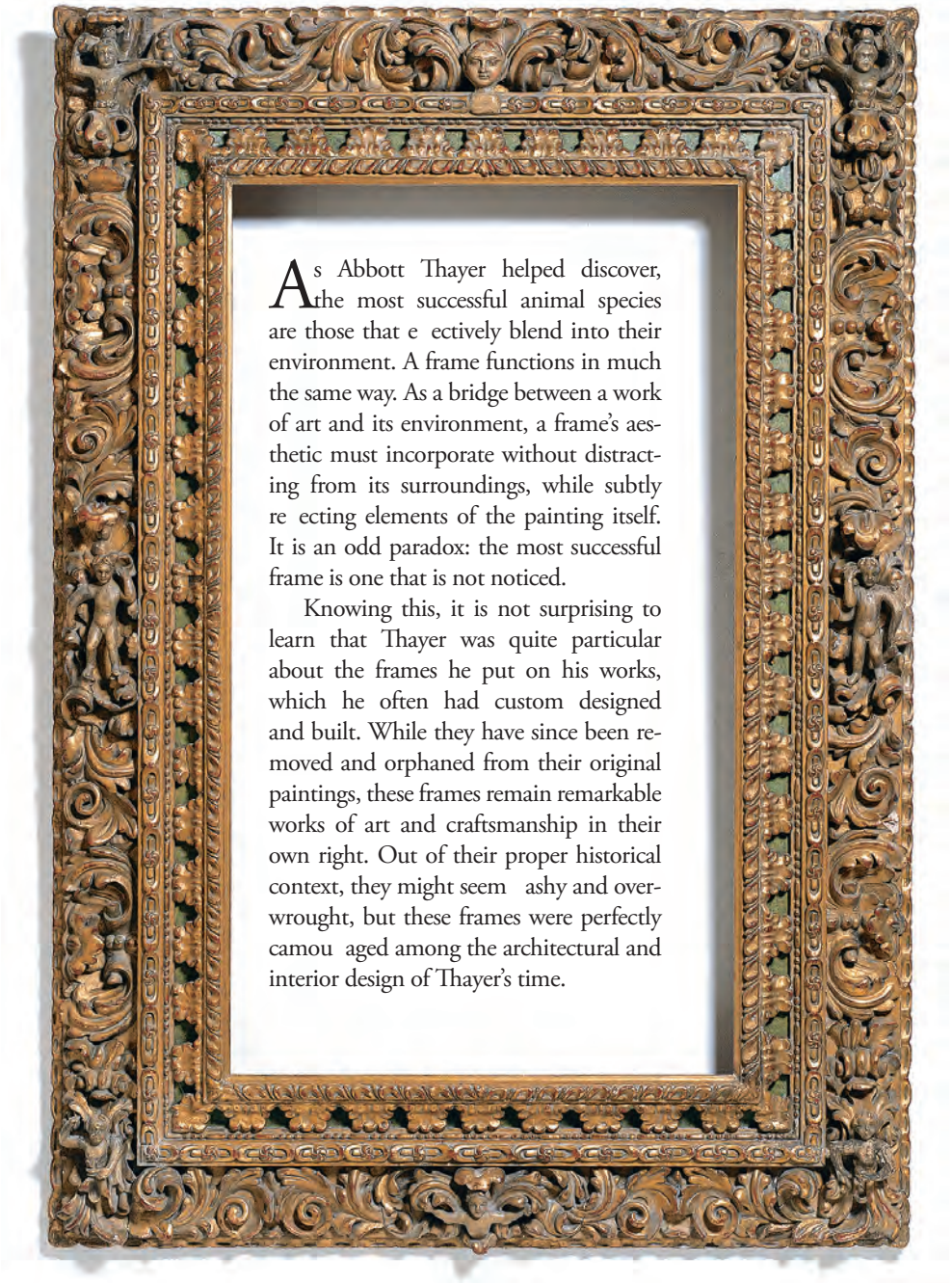
Sandpiper, ca. 1860

Watercolor on paper

7 x 8 in.

FRAMING AND CAMOUFLAGE

A Marriage of Principles and Illusions



As Abbott Thayer helped discover, the most successful animal species are those that e ectively blend into their environment. A frame functions in much the same way. As a bridge between a work of art and its environment, a frame's aesthetic must incorporate without distracting from its surroundings, while subtly re ecting elements of the painting itself. It is an odd paradox: the most successful frame is one that is not noticed.

Knowing this, it is not surprising to learn that Thayer was quite particular about the frames he put on his works, which he often had custom designed and built. While they have since been removed and orphaned from their original paintings, these frames remain remarkable works of art and craftsmanship in their own right. Out of their proper historical context, they might seem ashy and overwrought, but these frames were perfectly camou aged among the architectural and interior design of Thayer's time.

Study for Frame Design, ca. 1904

Pencil on paper

8 x 7 in.

Opposite
Designer: Stanford White

Manufacturer:
Newcomb-Macklin Co.

Venetian Style Frame,
early 20th century

23k gold leaf, water gilded over red bole, polychrome, gesso, compo, bass wood, mitered interior spline corner construction

66 x 45 in. (outer edge)
47 ½ x 26 ½ in. (sight edge)

Some of the most dynamic sculptural frames were made in Venice during the 16th and 17th centuries. This 20th century version includes all the important elements characteristic of the period: pierced and open foliate ornamentation, gures, masks, and a beautifully rich gilded patina accented with a polychrome background. In some cases, these frames even overpowered the painting. In a letter to Thayer from his collector Charles L. Freer dated April 24, 1899, Freer states: "I think the frame seriously injures the picture... Will you do me the kindness and yourself the satisfaction of selecting a new frame... with a atter pro le ... for your new canvas?"

Abbott Thayer was a lifelong colleague and compatriot to many leading artists, politicians and gures of his day. From Theodore Roosevelt to Mark Twain, and from the painter James McNeill Whistler to the renowned evolutionary biologist Edwin Bagnall Poulton, the company Thayer kept was dynamic and brilliant, occasionally contentious, and always spirited.

These relationships extended into his work, and this is perhaps exempli ed in the frames designed for Thayer by the renowned architect Stanford White (1853 – 1906). A cultural and artistic dynamo of his era, whose design principles embodied the American Renaissance Revival of the turn of the century, White's architectural achievements included the Washington Square Arch and the second incarnation of the Madison Square Garden (since renovated) in New York City. He was also a frame designer, and Stanford White frames have since become a staple in the framing industry. But the quality and style of the frames he designed for Thayer's paintings are of unique and unparalleled distinction.

Designer: Stanford White

Manufacturer:
Newcomb-Macklin Co.

Dutch-Italian Frame,
early 20th century

Metal leaf, oil gilded over red bole, gesso, compo, bass wood, parallel spline corner construction

41 x 40 in. (outer edge)
26 x 25 in. (sight edge)

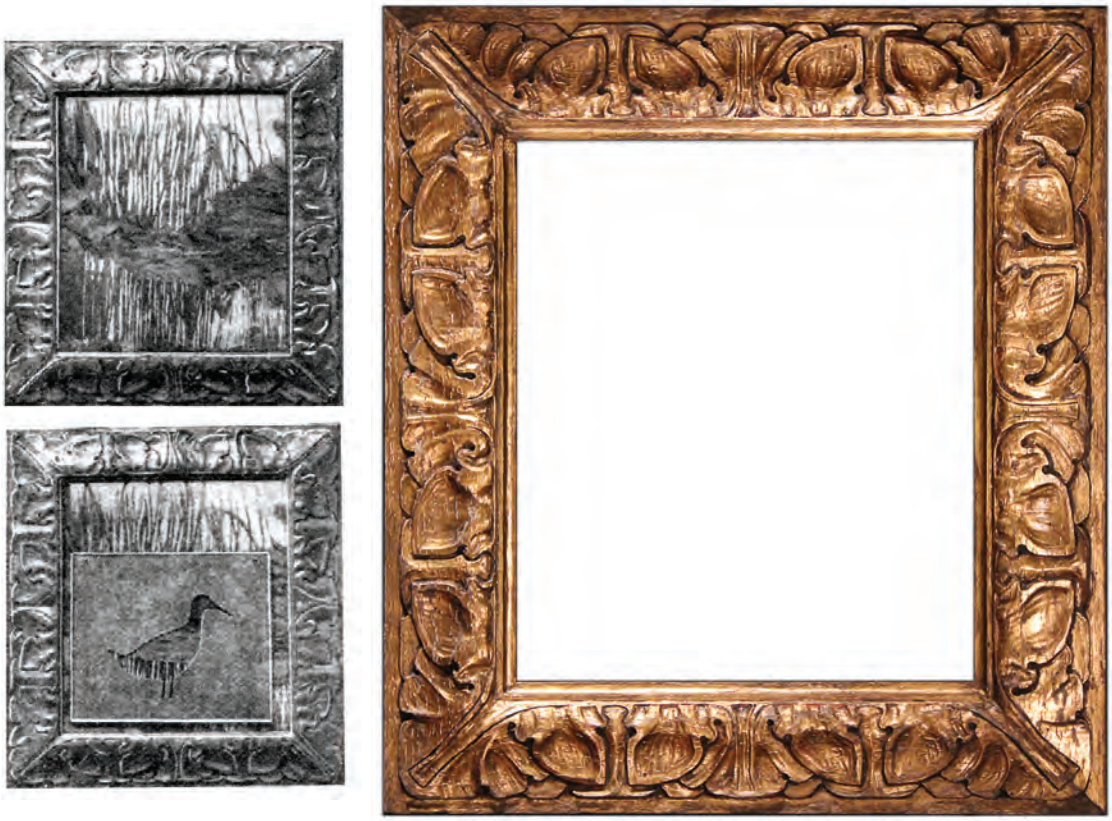
This frame is a marriage of 17th century Dutch and Italian elements. The gadrooned sight edge is classic Italian while the crossetted corner, wobble pattern and low-relief basket weave mimic frames made in the Netherlands. The rich complexity of surface texture and contrasting ornaments produce a refreshing yet traditionally sound result. The ability of the craftsmen to work in a wide range of techniques is an important factor in the success of these frames. Charles L. Freer wrote that "...the coloring of the gold should depend entirely upon the colors in the picture. Gold of various shades may be used or painted of various shades and nished in...the enamel process."

Once designed, White's frames were usually produced by the proli c Newcomb-Macklin Company, a group of East Coast frame makers who framed the works of many of Thayer's contemporaries, such as Max eld Parrish, George Bellows and John Singer Sargent.

White's frame designs drew upon an international scope of historical traditions, often juxtaposing elements of divergent styles within individual frames. The frames—an amalgam of modernity and classicism, opulence and simplicity—shed light not only on Thayer's work and the styles of his period, but on the nature and substance of the country's burgeoning artistic traditions at the turn of the 20th century.

William Bruce Adair
Frame Historian
Gold Leaf Studios

Mr. Adair is an internationally renowned frame specialist and conservator, who teaches and publishes extensively on the subject. In 1991 he won the Rome Prize in Design.



Thayer often employed a broad leaf pattern frame for exhibiting his camou age demonstrations; the rustic naturalism and broad strident leaf design on the frame coincided with his personal devotion to the rhythms and beauty of the natural world. Onto the frames, he would frequently affix cutouts that swung on a hinge over the paintings (top of page 53), which enabled viewers to visualize each animal both in and out of the context of its natural environment and observe the e ects of camou age rsthand.

The frame's design originates from the Emilia-Romagna region of Italy, commonly used from the sixteenth century on, and Thayer's use of this frame for public exhibits of his camou age work was a brilliant device to compliment its prestidigitation. Like this one, many of the frame-making styles of this time were in uenced by the Boston Arts and Crafts movement, which played a large role in the reformation of design aesthetics in the United States, moving away from the excessive ornamentation of the Victorian era. It was in Boston that handmade frames were exhibited for the rst time without paintings and considered to be works of art in their own right.

The survival of two original exhibit frames (one pictured above), as well as other demonstration artifacts, was a matter of unlikely historical fortune, having been retrieved by Thayer's longtime protégé, Richard Sumner Meryman, from the artist's abandoned and crumbling studio in Dublin long after his death.

Another type of frame that Thayer often employed for his camou age presentations was the grille frame (bottom of page 53), which complimented the work perhaps even

Left: *Framed studies of a snipe in a forest pond for camou age exhibition at M Knoedler Company and the Home of Cornelius Vanderbilt*, ca. 1918

Broad Leaf Pattern Frame, early 20th century

Water gilded over red bole, gesso, hand carved wood, interior spline corner construction.

42 x 38 in. (outer edge)
28 x 24 in. (sight edge)

Study for Portrait Painting in a Frame, undated

Pencil on paper

7 x 5 1/2 in.

In a pierced English Rococo Revival frame, ca. 1860

Oil gilded over black bole, gesso, compo, wood, interior spline corner construction

18 x 15 in. (outer edge)

Collection of Susan Hobbs

This frame, while not original to Thayer, is similar to what the artist may have used for smaller works such as this one. At the turn of the century, many walls were fashioned with highly textured, embossed wallpaper called anaglypta. A frame like this, with a heightened contrast and piercing in the ornament, would create dark shadows and strong highlights against the ornate wall, blending them together visually like dappled light through the eaves of a forest interior.

Opposite:
Designer: Stanford White

Manufacturer:
Newcomb-Macklin Co.

Laurel Leaf Frame,
early 20th century

Burnish bronze over red bole, gesso, plaster, bass wood, lap-joint corner construction

76 ½ x 55 ½ in. (outer edge)
65 ½ x 44 ½ in. (sight edge)

more e ectively than the broad leaf pattern frame. Inspired by a sixteenth century Venetian idea and developed by Stanford White, this frame is typically associated with the work of Thomas Wilmer Dewing, but it is seen here for the rst time outside of its usual context. What makes the frame so appropriate for Thayer's presentations is that it mimics the dappled light from a forest interior by placing a light-re ecting gold panel behind the pierced grille ornamentation. This stunning device makes the re ected light appear as if it is emanating from within the interior of the frame.

It is made clear by his many frame drawings (above, page 63) that Thayer was interested in pulling the stark contrasts and twisted contours of the natural world into his frame designs. Whether it was apparent to the artist or purely subconscious, it now seems clear that by striving to make frames disappear into his artworks was a marriage of Thayer's scrupulous design sensibilities with his increasing involvement in the principles and beauty of camou age.

The laurel leaf and berry motif is one of the most common design elements of the classical revival at the turn of the century. In Greco-Roman classical ornamentation, the laurel leaf represents renewal, resurrection, glory and honor. In this frame, the soft hue of the burnish-bronze surface treatment creates a subtle e ect. Once called Roman gilding, the nish has a patina characteristic of a much older frame. It is produced by brushing a mixture with highly re ned bronze powder onto the frame's surface, and then burnishing it to a desired level of luster. This allows for a dynamic range of values, as there are many di erent shades of bronze. The background color resembles bronze statuary which, when combined with the high burnish on the tips of the leaves, creates a digni ed antique e ect.

Bibliography

Works referenced in the writing, editing and making of this catalog. All listed works are recommended for further reading on the artistry, science, and history of Abbott Handerson ayer, animal camouage, and the history of camou age in the military.

Adams, Henry. 2011. "Ornithology, Infantry and Abstraction." Art and Antiques Magazine. North Carolina: Art & Antiques Worldwide Media, LLC.

Anderson, Ross. 1982. *Abbott Handerson ayer*. New York: The Everson Museum of Art. 82-071229.

Barcott, Bruce. 2011. "Invisible, Inc." The Atlantic. District of Columbia: The Atlantic Monthly Group.

Behrens, Roy R. 2009. *Camoupedia: a compendium of research on art, architecture and camou age.* Iowa: Bobolink Books. 0-9713244-6-8.

Behrens, Roy R. 2002. *False Colors: Art, Design and Modern Camou age*. Iowa: Bobolink Books. 0-9713244-0-9.

Behrens, Roy R. 2012. *Ship Shape: A Dazzle Camou age Sourcebook*. Iowa: Bobolink Books. 13: 978-0-9713244-7-3.

Colby, Carl. (Director). 2008. *Invisible: Abbott ayer and the Art of Camou age*. USA: PRP Productions.

Diamond, Judy and Bond, Alan B. 2014. "The Visual Trickery of Obscured Animals." American Scientist, Volume 11, Number 1. North Carolina: Sigma Xi, The Scienti c Research Society.

Johnstone, Will B. 1918. "Camou age First Studied From Nature Herself By American Painter." The Evening World Daily Magazine. New York: The Press Publishing Co.

Lee, Elizabeth. 2010. "Therapeutic beauty: Abbott Thayer, tuberculosis, and angels of art." Hektoen International Journal, Volume 2, Issue 3. Chicago, Illinois: Hektoen Institute of Medicine. Web. 2155-3017. Originally published 2004 in American Art, Volume 18, Number 3. The University of Chicago Press.

Meryman Jr., Richard S. 2006. "Abbott Handerson Thayer (1849-1921)." Monadnock Art, Friends of the Dublin Art Colony. New Hampshire: Monadnock Art/FDAC. Web.

Newark, Tim. 2007. *Camou age*. London: Thames & Hudson, Ltd. 978-0-500-28710-1.

Norelli, Martina R. 1975. *American Wildlife Painting*. New York: Galahad Books. 0-88365-643-4.

Stevens, Martin, and Merilaita, Sami. 2011. *Animal Camou age: Mechanisms and Function*. Cambridge: Cambridge University Press. 978-0-521-15275-0.

Thayer, Gerald H. 1909. *Concealing-Coloration in the Animal Kingdom: An Exposition of the Laws of Disguise rough Color and Pattern: Being a Summary of Abbott H. ayer's Discoveries*. New York: Macmillan.

White, Nelson C. 1951. *Abbott H. ayer: Painter and Naturalist*. Connecticut: Connecticut Printers.

Archives of American Art. 2013. "Abbott Handerson Thayer and Thayer family papers, 1851-1999, bulk 1881-1950." District of Columbia: Smithsonian Institution. Web.

Poulton, Edward B. 1888. Notes in 1887 upon Lepidopterous larvae. Trans Entomol Soc Lond. 1888: 595-596.

[2] Poulton, Edward B. 1890. *e Colours of Animals: eir Meaning and Use. Especially Considered in the Case of Insects*. Second Edition. The International Scienti c Series. London: Kegan Paul, Trench Trübner, & Co. Ltd.

[3] Thayer, Abbott H. 1896. "The law which underlies protective coloration." The Auk. 13: 477-482.

[4] Thayer, Gerald H. 1909. *Concealing-Coloration in the Animal Kingdom: An Exposition of the Laws of Disguise rough Color and Pattern: Being a Summary of Abbott H. ayer's Discoveries.* New York: Macmillan.

[5] Thayer, Abbott H. 1903. "Protective coloration and its relation to mimicry, common warning colours, and sexual selection." Trans R Entomol Soc Lond. 26: 553-569.

[6] Gould, Stephen J. 1991. *Red Wings in the Sunset.* In Bully for Brontosaurus. pp. 209-228. London: Penguin Books.

[7] Behrens, Roy R. 2009. "Revisiting Abbott Thayer: Non-scienti c re ections about camou age in art, war and zoology." Phil. Trans. R. Soc. B. 364: 497-502.

Director's Note

When our wonderful friend, William Adair, brought Ari Post into our close circle of Abbott Thayer fanatics in March of 2012, we finally had the means to make decades of effort an "overnight" success. William and Ari, with the Gold Leaf Studios team and other circle luminaries, have organized a marvelous collection and built the foundation for new appreciation of Abbott Handerson Thayer and his "Beautiful Law of Nature."

Thayer sought out a pure world of art, abandoning the realm of fawning socialites and lucrative commissions in New York to colonize a corner of New Hampshire with his family and followers. At the base of his altar, Monadnock, full immersion into nature energized his contemplations of its forms, its spirituality and its physics. Thayer's intense, personal flux of artistic passion and scientific discipline coalesced in his theory of concealing coloration with profound effects still unfolding today.

Jean Reasoner Plunket, his granddaughter and my mother, always kept Thayer's art and ideas at the center of our family life. Most of the works in this collection are those she protected for us, those by which she proudly passed him along to her children—and now to a broader audience. I thank her and my sisters, Kathy Versluys, Peg Hyland and Liz Riviera for their invaluable devotion, guidance and artistry in seeing our project to fruition.

Our gratitude extends to many others who have helped carry Thayer's art and science forward: the late Smithsonian scholar Richard Murray, for his groundbreaking work and research; Roy Behrens for his inestimable enthusiasm, curiosity and insights; Melanie Leigh Matthewes and Claudia Pfeifer of the National Sporting Library and Museum for first exhibiting the collection; Lee Glazer, Associate Curator of American Art at the Freer and Sackler Galleries, along with the rest of the Smithsonian Institution, for their support and partnership in taking this collection to unprecedented new heights; Robin Martin and Susan Hobbs for lending their work to advance new scholarship; Major General John Altenburg, Chairman of The Army & Navy Club Library Trust, for his generous support and partnership; and finally to Richard Meryman, Jr., for his devotion to preserving the many legacies of Abbott Handerson Thayer.

Thayer never thought his own work complete, and he would be immensely grateful himself for all this.

John Plunket
Director, Abbott Handerson Thayer Family and Estate

About the Editor

Ari Post is a writer, editor and project manager with a specialization in content development for fine art and museum institutions. He has worked with the Smithsonian Freer and Sackler Galleries, The Architect of the Capitol, and The Army and Navy Club Library Trust. He serves as the chief art critic and features editor for The Georgetowner (since 2010). He contracts regularly with private clients on writing and editing projects. He can be reached at: AriBenjaminPost@gmail.com.