Yale PEABODY MUSEUM OF NATURAL HISTORY

YALE MINERAL AND GEM SYMPOSIUM IN DAVID FRIEND HALL

2018 Yale Mineral and Gem Symposium in David Friend Hall

Saturday, October 20, 2018

David Friend Hall, Yale Peabody Museum of Natural History

Keynote Speaker
Dr. Jack Ogden, Fellow of the Society of Antiquaries of London and of the Gemmological Association of Great Britain

General theme of the Yale Mineral and Gem Symposium: *The Cultural and Scientific Value of Mineral Beauty*

2018 Agenda:

Friday, October 19, 2018

5:00 – 6:00pm	**Jack Ogden**; Striptwist Ltd., UK *The Early History of Diamonds*; followed by book signing
6:00 – 7:30	**Evening Reception**

Saturday, October 20, 2018

Symposium

8:15 – 8:45am	**Continental Breakfast** Hall of Minerals, Earth and Space Peabody Museum

Morning Session

8:45 – 9:30	**David Friend**; CEO, Wasabi, Inc. *Natural History Museums that Inspire*
9:30 – 10:15	**Alyson M. Thibodeau**; Assistant Professor of Earth Sciences, Dickinson College *Was there a Turquoise Trail? Rethinking Ancient Turquoise Mining and Exchange in the Southwestern United States and Mexico*
10:15 – 10:30	**Break**
10:30 – 11:15	**C.R. "Cap" Beesley**; President ARD Analytics, Inc. and Chairman of Gemcore's Gemstone Standards Commission *"Collecting the Classics™" Part III: Emeralds from Ancient Egypt to the Gemstone Classics of Colombia*
11:15 – 12:00pm	**Christopher "Mike" Breeding**; Gemological Institute of America *Colored Diamonds: The Beauty and Value of Imperfection*
12:00 – 1:30	**Lunch (provided)**

Afternoon Session

1:30 – 2:15	**Anikó Bezur**; Director of the Yale IPCH Technical Studies Laboratory *The Enemy Within – Discovering the Presence of a Rare Mineral and Exploring Its Harmful Genesis in a Renaissance Polychrome Terracotta Relief*
2:15 – 3:00	**Walter "Les" Presmyk**; Vice Chairman, Flagg Mineral Foundation; Vice President, Tucson Gem and Mineral Society *Arizona and Its Historic Love Affair with Minerals*
3:00 – 3:15	**Break**
3:15 – 4:00	**Peter K. M. Megaw**; President, IMDEX/Cascabel; co-founder, MAG Silver and Minaurum Gold *Electric Opal: Unique Daylight Luminescing Hyalite Opal from Mexico*
4:00 – 4:45	**Jack Ogden**; Striptwist Ltd., UK *Science and Delusion: How Minerals Drifted into Myth and Back – keynote presentation*

2018 YALE MINERAL AND GEM SYMPOSIUM - ABSTRACTS

< Event information

The Early History of Diamonds

Dr. Jack Ogden
Striptwist Ltd., UK

Two thousand years ago, in Roman times, diamonds were already considered the most valuable of gems. They were rare, coming to Europe from India, and far too hard to cut or polish. It was this rarity and invincibility that gave them allure. Following the collapse of the Roman Empire, it was many centuries before diamonds began to reach Europe again, and then their invincibility waned as the techniques to cut and polish them were developed. This presentation will trace the early history of diamonds through rare surviving examples and the legends surrounding them, ending with the Renaissance Period when cutting and polishing were fully established and diamonds exhibited the bright sparkle we associated with them today.

Natural History Museums that Inspire

David Friend
CEO, Wasabi, Inc.

The Yale Peabody Museum was founded in 1866. This was an era of great explorers -- naturalists, botanists, geologists, zoologists, and paleontologists – who roamed distant continents and returned with boatloads of specimens of birds, animals, bugs, fossils, rocks, minerals, and more. They needed someplace to store it all. Enter the natural history museums.

Natural history museums became a great resource for attracting top scientists and students. They distinguished great universities like Yale and Harvard by providing a rich source of materials for study and analysis. Like today's "big science" facilities, such as telescopes, particle colliders, and supercomputers, natural history museums became the face of universities to the scientific community, and to the public.

Today, natural history museums have two distinct missions: the "upstairs" mission is to educate the public and inspire future generations of amateur and professional scientists. The "downstairs" mission supports scientific research. As museums come to grips with this growing "upstairs-downstairs" dichotomy, their facilities and collections have to change. We're seeing that happen right here and right now at Yale.

Was there a Turquoise Trail? Rethinking Ancient Turquoise Mining and Exchange in the Southwestern United States and Mexico

Dr. Alyson M. Thibodeau
Assistant Professor of Earth Sciences, Dickinson College

Turquoise is the blue-green mineral that was highly valued and broadly used by prehispanic societies that lived in what is today the American Southwest and Mexico. In the American Southwest, traces of prehispanic turquoise mines are present across Arizona, New Mexico, Colorado, Nevada, and California. However, archaeological evidence for the use of turquoise extends over a broader area, stretching through Mexico to parts of Central America. How can we trace the geologic origins of turquoise artifacts? Was turquoise exchanged or moved over long distances? This talk will address the current state of our knowledge on the use, mining, and exchange of the mineral by prehispanic groups in North America. In particular, I will discuss recent research on the source of Aztec and Mixtec turquoise artifacts that overturns traditional ideas about the long-distance movement of the mineral and provides a new perspective on the availability of turquoise outside of the American Southwest.

"Collecting the Classics™" Part III: Emeralds from Ancient Egypt to the Gemstone Classics of Colombia

C.R. "Cap" Beesley
President ARD Analytics, Inc. and Chairman of Gemcore's Gemstone Standards Commission

This year Cap will present Part III of the Precious Gemstone Trilogy, "Collecting the Classics™". Part I of the series concentrated on the sapphires of Kashmir and was presented at the 150th year celebration of the Yale Peabody Museum and the Grand Opening of the spectacular David Friend Hall of Gems and Minerals. Part II, focused on the origin, enhancement and quality assessment of classic rubies from the Mogok region of Burma (Myanmar).

The 2018 presentation has been expanded to include a comprehensive analysis of the global, gemological and historical aspects of emerald collecting from ancient Egypt to the gemstone classics of Colombia and emeralds from the Hiddenite hills of North Carolina. Included in this session will be an

analysis of the challenges of determining country of origin, enhancement/treatment detection, quality assessment and the impact of these important issues on the market value of emeralds.

Colored Diamonds: The Beauty and Value of Imperfection

Dr. Christopher "Mike" Breeding
Gemological Institute of America

Diamonds usually invoke thoughts of large crystal-clear and flawless stones that sparkle in the sunlight. These magnificent gems are associated with love or social status and are prized for their beauty and purity, not to mention their immense value. Unbeknownst to most, however, is that the occurrence of certain imperfections, or lattice defects, in diamond can produce colors that are much rarer and more valuable than any colorless stone. In 2015, a single 12 carat blue diamond sold for more than US $48 million.

Imperfections in diamond, at the atomic level, can produce all the colors of the rainbow. Some defects consist of impurities like nitrogen or boron incorporated during growth and others result from misaligned or missing atoms caused by post-growth deformation or exposure to radiation. For a mineral ideally composed entirely of carbon, diamond is an extremely complex gem in which imperfection is not necessarily detrimental.

The Enemy Within – Discovering the Presence of a Rare Mineral and Exploring Its Harmful Genesis in a Renaissance Polychrome Terracotta Relief

Dr. Anikó Bezur
Wallace S. Wilson Director of the Yale IPCH Technical Studies Laboratory

Salts top the list of "usual suspects" when art and architectural conservators encounter flaking paint on a porous surface such as limestone, brick, or terracotta. Therefore, it was not surprising to find salt crystals growing within and between paint layers on a fifteenth-century gilt and polychromed terracotta relief, *Virgin and Child* by Michele da Firenze, undergoing examination and conservation treatment in the collection of the Yale University Art Gallery. Learning that the culprit was challacolloite, a mineral first named in 2005, was intriguing along with the fact that this compound had been documented in fumaroles of volcanos, including those in Italy. This talk details our unusual discovery, the likely genesis of challacolloite within paint layers, and the consequences of this on the treatment and future stability of this beautiful object.

Arizona and Its Historic Love Affair with Minerals

Walter Lesley "Les" Presmyk
Vice Chairman, Flagg Mineral Foundation; Vice President, Tucson Gem and Mineral Society

While the indigenous tribes in Arizona did not develop the metal working skills of the Inca and Maya civilizations, the use and importance of turquoise and other minerals is evident for centuries before the first European set foot in this area. Arizona's history is driven by the exploration for gold and silver by the Spanish starting in the 1500s and continuing through 1848 when the northern portion became United States territory and the acquisition of the southern portion of Arizona in 1853 with the Gadsden Purchase.

Since that time and until statehood was granted in 1912, minerals and mineral specimens have played a significant role with the early explorers and settlers, along with the mining companies helping to promote statehood. This culminated in the Phelps-Dodge display of fabulous azurite, malachite and calcite specimens at the 1893 Columbian Exposition and then the World's Fair in St. Louis in 1904.

Electric Opal: Unique Daylight Luminescing Hyalite Opal from Mexico

Dr. Peter K. M. Megaw
President, IMDEX/Cascabel; co-founder, MAG Silver and Minaurum Gold

Electric Opal™ – Daylight luminescing hyalite opal shows a uniquely beautiful and pronounced color-change phenomenon from near-colorless or pale-yellow in incandescent light; to bright chartreuse green in indirect sunlight. It occurs as free-standing lustrous transparent botryoids that make very attractive specimens, which are also facetable into extraordinary gemstones. It was hand-mined from 2013 to 2015 when the deposit was exhausted.

Electric Opal™ captured the immediate attention of the mineral and gemstone world and led to a multi-national/multi-disciplinary research effort to characterize the material. They are Opal-AN (aka hyalite) the amorphous (A), glass-like opal variety consisting of network-forming (N) hydrated silica molecules. Opal-AN is always 'common' opal as it does not have a regular array of spheres or microstructure to give it play-of-color. The daylight-induced green luminescence stems from trace amounts of the uranyl molecule (UO2)2+, but the radioactivity of the opal is well within background levels and it is safe to wear.

Science and Delusion: How Minerals Drifted into Myth and Back

Dr. Jack Ogden
Striptwist Ltd., UK

The attractive minerals we think of as gems today have been cherished by people from very early times, but as scientists we usually dismiss the myths and powers that have been associated with

them as manifestations of ignorance and superstition. A more careful look, however, reveals that there can be a rational origin for some of these beliefs, but they have been misinterpreted by us, or by the medieval scribes who copied the earlier texts. Scrape away the veneer of supposed magical properties of minerals and sometimes we can gain insights into the history of science and medicine.

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Striptwist Ltd U

The Early History of Diamonds

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David riend

CEO Wasabi Inc

Natural History Museums that Inspire

David riend has been collecting minerals since the age of Son of a chemical engineer he grew up studying crystals in his basement laboratory and discovering them in rock formations near his home outside New ork City Wherever he travelled with his parents museums with mineral collections were always on the itinerary

Mr riend has a BS from ale and was a David Sarnoff ellow at the Princeton University Graduate School of Engineering He co founded his first company in and has founded technology companies over the years including Carbonite – a NASDA listed company in the computer backup and disaster recovery market – and most recently Wasabi – a company that provides fast very inexpensive data storage in the cloud He has been on numerous boards of both for profit and non profit institutions including the New England Conservatory Berklee College of Music and the Brookings Institution He is chairman of the board of Boston Baroque a Grammy nominated orchestra and chorus His gifts to ale include the construction of the David riend Hall at the ale Peabody Museum of Natural History

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Dr Alyson M Thibodeau

Assistant Professor of Earth Sciences Dickinson College

Was there a Turquoise Trail? Rethinking Ancient Turquoise Mining and Exchange in the Southwestern United States and Mexico

Dr Thibodeau is an Assistant Professor of Earth Sciences at Dickinson College in Carlisle Pennsylvania She holds an M S and a Ph D in Geosciences from the University of Arizona and a B A in Geology and Anthropology from Amherst College As a graduate student she held an NS IGERT fellowship in Archaeological Science an experience that led her to pursue research that applies geochemistry to archaeological questions and problems She specializes in using isotopic techniques to trace the sources of artifacts especially those made of turquoise and is especially active in research pertaining to the American Southwest and Mexico Among other institutions she has collaborated with the National Museum of the American Indian the American Museum of Natural History the Arizona State Museum and the Museo del Templo Mayor Her work has been covered by a variety of outlets including The New ork Times Archaeology Magazine and Earth Magazine

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C R Cap Beesley

President ARD Analytics Inc and Chairman of Gemcore s Gemstone Standards Commission

"Collecting the Classics™" Part III: Emeralds from Ancient Egypt to the Gemstone Classics of Colombia

C R Cap Beesley an internationally known consultant and gem sciences specialist is president of Analytics Research and Development a firm focused on consulting in gem and mineral related fields and is chairman of the Gemstone Standards Commission at Gemcore a non profit educational organization dedicated to developing consumer protection programs for gemstone buyers and collectors

Beesley was founder and president of American Gemological Laboratories a New ork based international gem testing facility specializing in the determination of country of origin gem enhancement detection and quality assessment of ruby emerald and sapphire He also served as the primary gem consultant to the United Nations Minerals Branch for more than years establishing gem laboratories and training facilities and teaching at the University of Peshawar in Pakistan the University of ashmir in Azad and at the Geological Survey of Malawi

Previously as a senior staff member of the Gemological Institute of America he was responsible for implementing GIA s six month resident program on the East Coast developing the model for its first colored stone grading course and directing GIA s gem investment program

Beesley serves on ale University s Leadership Council for the Peabody Museum of Natural History and as chairman of the Museum s Mineral and Gem Advisory Board He is also a Research Associate in the Department of Geosciences at the University of Arizona and since a member of the University s Gem and Mineral Museum Pro ect Advisory Board

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Dr Christopher Mike Breeding

Diamond analytical testing manager Gemological Institute of America
Colored Diamonds: The Beauty and Value of Imperfection

Dr Christopher Mike Breeding is a senior research scientist and manager of diamond analytical testing at the Gemological Institute of America in Carlsbad California He obtained a B S in geology from the College of William and Mary in Virginia a Ph D in geology from ale in and is a GIA Graduate Gemologist

Over the last years at GIA Mike has worked on every type of gemstone ranging from quartz to diamond He also manages GIA s postdoctoral associates and interns in the Carlsbad research group His current research is concerned primarily with origin of color and configuration of lattice defects in colored and colorless diamonds and identification of treatments and synthetics He regularly works to develop new instruments for the diamond trade and gives seminars worldwide to educate the industry about diamond defects and non destructive spectroscopic analysis of gemstones

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The Enemy Within – Discovering the Presence of a Rare Mineral and Exploring Its Harmful Genesis in a Renaissance Polychrome Terracotta Relief

Dr Anik Bezur is Wallace S Wilson director of scientific research of the Technical Studies Laboratory at the ale Institute for the Preservation of Cultural Heritage She and her team use a variety of imaging and instrumental analytical techniques to examine and analyze cultural heritage ob ects in order to learn about their materials manufacturing techniques as well as changes in their appearance and other properties due to aging and human activities throughout their life histories Prior to her current position Dr Bezur was Andrew W Mellon research scientist for the Museum of ine Arts Houston and the Menil Collection worked at the Art Institute of Chicago as associate conservation scientist and served as a lecturer and assistant professor of conservation science in the Art Conservation Department at Buffalo State College She holds a PhD in materials science and engineering from the University of Arizona and completed graduate internships at the Getty Conservation Institute and the Smithsonian s Museum Conservation Institute Dr Bezur s research interests include the study of ancient and historic technologies involved in the creation of material culture the alteration of ob ects through use and degradation and the adaptation and improvement of analytical techniques in this research Dr Bezur s recent pro ects include the study of the ale University Art Gallery s Education of the Virgin reattributed to painter Diego Vel zquez in by ohh Marciari and the discovery and documentation of a rare salt on Virgin and Child a terracotta relief by Michele da irenze She has also published research on still life paintings by Willem van Aelst the use of house paints by Pablo Picasso European porcelain the use of x ray fluorescence spectroscopy in the study of porcelain ob ects as well as other sub ects Dr Bezur worked with the Sic n Archaeological Pro ect in Peru for over a decade studying the copper metallurgy of the Middle Sic n period CE and assisting with materials characterization and conservation needs of the excavated materials

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Vice Chairman lagg Mineral oundation Vice President Tucson Gem and Mineral

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Les started collecting at the age of and ust attended his th straight Tucson Show Their displays have received A MS Regional and National Trophies along with the Prospectors and Pearl Trophies in Denver and the Desautels Lidstrom and Bideaux Trophies at the Tucson Show Les is the recipient of the Carnegie Mineralogical Award

He is the current Vice President of the Tucson Gem and Mineral Society and current Vice Chairman of the lagg Mineral oundation He is a past President of the Mineralogical Society of Arizona Board Member and Chairman of the Arizona Mineral and Mining Museum oundation now the lagg Mineral oundation Les is a founding member of the University of Arizona Mineral Museum Advisory Board recently appointed to the advisory Board of the new Arizona Mining Mineral and Natural Resource Museum and a member of the Tucson Show Committee for years

He has explored and collected in a number of localities in Arizona Missouri and Mexico and provided engineering expertise at the San rancisco mine in Sonora Mexico the Brushy Creek mine in Missouri and the Red Cloud mine in Arizona Les has written several articles and co authored the recently published Collecting Arizona He has spoken at the Dallas Symposium and the Northwest riends of Mineralogy Symposium along with the Arizona and New Mexico Symposiums the Tucson Springfield and Denver Shows and numerous mineral clubs throughout the United States

His community activities include being a former councilmember and vice mayor of Gilbert Arizona He is currently serving as Chairman of the Parks and Recreation Advisory Board Vice Chairman of the Dignity oundation Board President of The Leadership Centre member of the Gilbert Veterans Day Committee and has ust been appointed to the year General Plan Update Committee

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Mr. Friend has a BS from Yale and was a David Sarnoff Fellow at the Princeton University Graduate School of Engineering. He co-founded his first company in 1970 and has founded 6 technology companies over the years, including Carbonite – a NASDAQ-listed company in the computer backup and disaster recovery market – and most recently, Wasabi – a company that provides fast, very inexpensive data storage in the cloud. He has been on numerous boards of both for-profit and non-profit institutions, including the New England Conservatory, Berklee College of Music, and the Brookings Institution. He is chairman of the board of Boston Baroque, a Grammy-nominated orchestra and chorus. His gifts to Yale include the construction of the David Friend Hall at the Yale Peabody Museum of Natural History.

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Vice Chairman, Flagg Mineral Foundation; Vice President, Tucson Gem and Mineral

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Arizona and Its Historic Love Affair with Minerals

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Les started collecting at the age of 10 and just attended his 55th straight Tucson Show. Their displays have received AFMS Regional and National Trophies, along with the Prospectors and Pearl Trophies in Denver and the Desautels, Lidstrom and Bideaux Trophies at the Tucson Show. Les is the recipient of the 2017 Carnegie Mineralogical Award.

He is the current Vice President of the Tucson Gem and Mineral Society and current Vice Chairman of the Flagg Mineral Foundation. He is a past President of the Mineralogical Society of Arizona, Board Member and Chairman of the Arizona Mineral and Mining Museum Foundation (now the Flagg Mineral Foundation). Les is a founding member of the University of Arizona Mineral Museum Advisory Board, recently appointed to the advisory Board of the new Arizona Mining, Mineral and Natural Resource Museum and a member of the Tucson Show Committee for 33 years.

He has explored and collected in a number of localities in Arizona, Missouri and Mexico and provided engineering expertise at the San Francisco mine in Sonora, Mexico, the Brushy Creek mine in Missouri and the Red Cloud mine in Arizona. Les has written several articles and co-authored the recently published "Collecting Arizona". He has spoken at the Dallas Symposium and the Northwest Friends of Mineralogy Symposium, along with the Arizona and New Mexico Symposiums, the Tucson, Springfield, and Denver Shows, and numerous mineral clubs throughout the United States.

His community activities include being a former councilmember and vice-mayor of Gilbert, Arizona. He is currently serving as Chairman of the Parks and Recreation Advisory Board, Vice-Chairman of the Dignity Foundation Board, President of The Leadership Centre, member of the Gilbert Veterans' Day Committee and has just been appointed to the 10 year General Plan Update Committee.

Dr. Peter K. M. Megaw

President, IMDEX/Cascabel; co-founder, MAG Silver and Minaurum Gold

Electric Opal: Unique Daylight Luminescing Hyalite Opal from Mexico

Dr. Peter K.M. Megaw, is a Consulting Geologist (PhD UofA) President of IMDEX/Cascabel and co-founder of MAG Silver and Minaurum Gold. Peter has been a passionate mineral collector since first setting foot in Santa Eulalia in 1977. He moved to Tucson in 1979 and quickly joined the Tucson Gem and Mineral Society, serving in most roles (except Treasurer) over the years. He took on the job of Exhibits Chair for the Tucson Show in 1984, a job he has kept for most of the last 35 years, giving him the opportunity to visit most of the world's major mineral museums with a special eye out for what they should bring to Tucson. His mineral collecting has come to focus almost exclusively on minerals of Mexico and he has spoken and written extensively on specimen localities there; most recently an in-depth article for *The Mineralogical Record* on the Santa Eulalia Mining District in Chihuahua, Mexico. He is also a contributing editor for *Rocks and Minerals* and co-authored a paper on Mexican Daylight Luminescing Hyalite Opal in the September 2018 issue. In his spare time he collaborates on studies of silver isotopes in silver minerals, is mindat.com's photo-moderator for submissions on Mexico, and co-moderator of the *Flagg Mineral Foundation* Mineral Forum, often with tongue planted firmly in cheek. A combination of some of the above led him to be awarded the Carnegie Mineralogical Award for 2009.

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