

THE PACIFIC CIRCLE



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PACIFIC CIRCLE NEWS

Business Matters

From Roy Macleod, outgoing President of the Pacific Circle

“From Berkeley to Manchester and Beyond”

For some 1,758 registered delegates, the week between July 21 and 28, 2013, witnessed the 24th and largest congress of the International Union for the History and Philosophy of Science – the largest in England since the 1931, and among the largest ever seen at Manchester University. The experience of engaging with some 1,400 papers, 411 sessions and 294 symposia, discussions, tours and excursions has left an indelible impression on those lucky enough to attend. As President of the Pacific Circle, I had the privilege of representing the Circle in its official role as a Scientific Commission of the Division of the History of Science and Technology (DHST). This was the seventh Congress at which I’ve represented the Pacific Circle since its inauguration, by Philip ‘Fritz’ Rehbock and myself, at the 17th International Congress at Berkeley in 1985. Since then, our membership has grown steadily, and now includes over 300 individuals and institutions around the world. It has been a pleasure to see growing interest in our work, not least among our colleagues in parallel Commissions devoted to Oceanography, Science and Empire, and East Asian Studies.

At these Congresses, commissions are invited to review their progress and future plans. It was with great pleasure that I was able to announce a new slate of officers, and several additions to our Council – colleagues with energy and enthusiasm who will I am certain take up many of the important issues now shaping the social and technical study of the sciences and the impact of new technologies on the Asia-Pacific – and Indo-Pacific – regions of the world. After several years in office, I am delighted to be succeeded as President by Professor John Gascoigne, of the University of New South Wales, whose distinguished career is outlined below. Suffice it to say that our best wishes and hopes go with him, for every success in leading the Circle in new forms of public engagement, and with colleagues in many emerging areas of scholarship. Our membership is strong and growing, and thanks to the efforts of our fine Editor, Peter H. Hoffenberg, and the continuing support of DHST, we have a vibrant newsletter and challenging website. Congratulations to all our new team! We keenly look forward to what we will achieve in the four short years until our next Congress – in Rio de Janeiro, in 2017.

Roy MacLeod

Many thanks to Roy and to the other former members of our Board and Council for their dedication, labors and persistence.

As noted by Roy, the Circle has a new set of Officers and Council Members after elections at the Congress in Manchester.

Please welcome aboard for the 2013-2017 term of office:

President: John Gascoigne, University of New South Wales

Vice-President: Zuoyue Wang, California State Polytechnic University

Secretary/*Bulletin* Editor: Peter Hoffenberg, University of Hawai'i-Manoa

Council Members:

Antony Alder, University of Washington

Warwick H. Anderson, University of Sydney

Buhm Soon Park, Korea Advanced Institute of Science and Technology,
Daejeon, South Korea

Miao Tian, Chinese Academy of Sciences, Beijing

Philip K. Wilson, East Tennessee State University

Christine Winter, Australian National University

Ex-Officio Council Members:

Jacob Hamblin, Oregon State University, Commission on the History of
Oceanography

Michael Osborne, Oregon State University, Commission on Sciences and
Empire

Our new President, **Prof. John Gascoigne**, was educated at Sydney, Princeton, and Cambridge. He has taught in Papua New Guinea (in 1973 at a teachers' college in Rabaul and in 1977-8 at the University of Papua New Guinea, Port Moseby) and, since 1980, has taught History at the University of New South Wales, where he is now a Scientia Professor. His publications have considered the interaction between the Scientific Revolution and the Enlightenment, and have increasingly focused on Pacific exploration. Among those publications are a two-volume work on Joseph Banks and his world, and a thematic study on Captain Cook. *Encountering the Pacific in the Age of Enlightenment* is forthcoming from Cambridge University Press in early 2014.

Buhm Soon Park, Council Member, is Associate Professor and Director of the Graduate School of Science and Technology Policy at Korea Advanced Institute of Science and Technology (KAIST) in Daejeon, South Korea. He received his Ph.D. in History of Science from Johns Hopkins University in 1999, and subsequently worked as an historian of biomedical sciences and research policy at the U.S. National Institutes of Health (NIH) before coming to KAIST in 2007. Park has numerous publications on the history of twentieth-century science, exploring such themes as the use of computers in quantum chemistry, science pedagogy and communication, and the government funding for biomedical research. He co-edited *Bridging the Technology Gap: Historical Perspectives on Modern Asia* (Seoul: Seoul National University Press, forthcoming), for which he also contributed a chapter on technonationalism and nuclear bureaucracy in Korea. He is currently writing a book on bureaucratic entrepreneurship and science policy, examining the rise of the NIH as the major patron of American biomedicine. Prof. Park serves as the editor of *Korean Journal for the History of Science* and as an editorial member of *Asian Research Policy*.

The Circle now has its own email address: thepacificcircle@gmail.com. Please feel free to contact the Editor and/or Editorial Assistant should you have any questions or concerns. Thank you.

The University of Hawai'i Foundation has provided a way for members to pay online dues and make a donation. Please visit www.uhfoundation.org/PacificCircle. If you are paying by check, please ensure that the check is made payable to "The U.H. Foundation" and write "Pacific Circle" in the memo space. Thank you.

New Members

The Circle would also like to welcome Dr. Kumar Prakash, Assistant Professor of History, Colorado State University. Dr. Prakash is a specialist in South Asian History and the History of Science, who recently published *Indigo Plantations and Science in Colonial India*, Cambridge University Press, 2012. This is a social history of indigo that illuminates the connections of South Asia with the wider world while covering the odyssey of indigo through peasant and plantation phases. That volume is reviewed below. His broad areas of interest include agriculture, the environment, science, and knowledge.

Prakash is currently writing a history of agriculture and social movements focused on India during the colonial and postcolonial eras, and the treatment of 'global' is an important element in that project. Further professional information is available at: <http://central.colostate.edu/people/pkumar/>.

Publications, Honors & Scholarly Activities by Circle Members

Kern Kenyon, *The Wide Warm Current of the North Pacific: An Oceanographer's Journal*, Lambert Academic Press, 2012.

Mark Merlin and Rob Clarke, *Cannabis: Evolution and Ethnobotany*, University of California Press, 2013. This publication offers “a comprehensive and interdisciplinary exploration of the natural origins and early evolution of this famous plant, highlighting its historic role in the development of human societies.”

Alan L. Bain is organizing two panels for the upcoming annual meeting of the American Association for the Advancement of Science, Pacific Division, to be held at the University of California-Riverside on June 17-20, 2014. The panels are: (1) the California Expositions, including San Francisco, 1915, and San Diego, 1915-1917 and (2) German and Austrian anthropologists in Asia during World War II and the use of their records to find survivors, and Japanese anthropologists in Asia during Japan's colonial period and World War II, including discussion of Unit 731. Please contact Alan Bain for more information at baina@si.edu.

Sandra Herbert writes as the current President of the History of Earth Sciences Society (congratulations!) to inform Circle members that the Society publishes a journal (both hard copy and online). The journal is interdisciplinary and includes scholarship by historians and geologists. She encourages submissions from members and readers. Please visit the Society's website at www.historyearthscience.org.

HSS NEWS

The 2013 Annual meeting of the History of Science Society will celebrate the 100th anniversary of *Isis* and is scheduled for November 21-24, at the Westin Boston Waterfront Hotel in Boston, Massachusetts. Additional information is available from the HSS Executive Office at info@hssonline.org and at <http://www.hssonline.org>.



FUTURE MEETINGS, CONFERENCES, and CALLS FOR PAPERS

1-3 November 2013. “Measurements Across the Sciences,” to be held at the University of Colorado–Boulder. Meeting will consider topics related to the historical and philosophical aspects of scientific measurement. For additional information, please visit <http://www.colorado.edu/philosophy/chps/conference.htm>.

15-16 November 2013. “Learned Societies and Academies, Travel and Travellers, Exploration and Explorers, 1600-1900,” to be held in Clermont-Ferrand during the Rendez-vous du Carnet de Voyage Festival. For information, please contact Sandhya Patel at sandhya.patel@univ-bpclermnot.fr.

9-11 January 2014. 5th International Conference on The History of Medicine in Southeast Asia (HOMSEA 2014), to be hosted by the Department of History, Ateneo de Manila University, Manila, the Philippines. Papers on the subject of the history of medicine and health in the region will be considered, with particular interest in those considering the history of medical education, indigenous medical traditions, medical biographies, the history of military medicine, organizing the medical profession, women’s health and family planning, medicine and social development, travel, contact, exchange, and the circulation of medicine, colonial and national medicine, historical medical texts, medicine and religious practices, Chinese and Indian medicine, and early medical professionals. For information about the meeting, please contact Laurence Monnais at laurence.monnais-rousselot@umontreal.ca.

5-8 February 2014. Annual Meeting of the Association for Social Anthropology in Oceania (ASAO), to be held at the King Kamehameha Hotel in Kailua-Kona on the Big Island of Hawai‘i. For information, visit www.asao.org/pacific/futuremeetings.htm.

17-20 June 2014. 95th Annual Meeting of the Pacific Division of the AAAS, to be held at the University of California, Riverside campus. Submissions should include the following: Organizer’s name and full contact information; same for any co-organizers; note whether a workshop or symposium; number of half-day sessions requested and any Pacific Division sections or affiliated societies; title of program; brief description of program; and list of speakers, facilities, special equipment relevant to proposed session. Questions? Please contact Dr. Roger Christianson at rchristi@sou.edu.

6-10 July 2004. 39th INHIGEO Symposium and 2014 Annual Conference, to be held at the Asilomar Conference Grounds, Pacific Grove, California, USA.

This INHIGEO meeting is co-sponsored by the Geological Society of America, History and Philosophy of Geology Division. For information about proposals and arrangements, please contact Prof. Kenneth Taylor at ktaylor@ou.edu.

BOOK, JOURNAL, EXHIBITION and RESEARCH NEWS

The International Commission of the History of Oceanography has a new website and blog, and the Commission invites Pacific Circle members to visit, sign up and participate. Please visit: <http://oceansciencehistory.wordpress.com>.

Mining in the Mid West, by Mary Callaghan of the Western Australia Museum, can be purchased from the Geraldton Regional Library at 37 Marine Terrace, Geraldton, WA 6530, Australia. The booklet is based on the exhibition, "Unearthed: Mining Stories from the Mid West."

Interested in mining on the other side of the continent? Consider *Angor to Zillimanton: Stories of 520 Deserted Towns and Mining Camps in North Queensland* by Colin Hooper. Order via the author's website: <http://desertedtownsatoz.com/>.

The Pacific Division of the AAAS has established a special web site for students. It includes information about funding, awards and other matters of interest to students. Please visit <http://associations.sou.edu/aaaspd/Students/Students.html>.

"The Bibliography of the History of Australian Science, Number 33, 2012," is now available in *Historical Records of Australian Science* 24:1 (2013). Helen M. Cohn compiled the bibliography.

Environmental History 18:3 (July 2013) includes a few articles of possible interest to Circle members: Greg Bankoff, "'Deep Forestry': Shapers of the Philippine Forests," pp. 523-556 and Jon Mathieu, "Long-Term History of Mountains: Southeast Asia and South American Compared," pp. 557-575.

Maritime, trade and other connections between India and Australia are considered in a series of articles in *Signals Quarterly* 103 (2013), the official publication of the Australian National Maritime Museum.

Isis 104:2 (June 2013) includes a special section on "Science, History, and Modern India," including the following articles: Kapil Raj, "Beyond Postcolonialism ... and Postpositivism: Circulation and the Global History of Science," pp. 337-347; Jonardon Ganeri, "Well-Ordered Science and Indian Epistemic Cultures: Toward a Polycentered History of Science," pp. 348-359; David Arnold, "Nehruvian Science

and Postcolonial India,” pp. 360-370; and Indira Chowdhury, “An Historian Among Scientists: Reflections on Archiving the History of Science in Postcolonial India,” pp. 371-380. Jahnvi Phalkey provides an “Introduction” to this section.

The Journal of Geology 121:5 (September 2013) includes several articles related to the Pacific: N. Mortimer, P.B. Gans, F.V. Foley, M.B. Turner, N. Daczko, M. Robertson, and I.M. Turnbull, “Geology and Age of Solander Volcano, Fiordland, New Zealand,” pp. 475-487; Xinqiang Wang, Xiaoying Shi, Dongjie Tang, and Wenhao Zhang, “Nitrogen Isotope Evidence for Redox Variations at the Ediacaran-Cambrian Transition in South China,” pp. 489-502; Markes E. Johnson and B. Gudveig Baarli, “Geomorphology and Coastal Erosion of a Quartzite Island: Hongdo in the Yellow Sea off the S W Korean Peninsula,” pp. 503-516 and Jun Tan, Jun-Hao Wei, Wen-Jie Shi, Ming-Zhi Wang, Yan-Jun Li, Le-Bing Fu, and Huan Li, “Formation of Wulong Mafic Dikes via Mixing of Enriched Lithospheric Mantle-Derived and Crustal Magmas, Eastern North China Craton,” pp. 517-535.

The 2014 Pacific Research Colloquium-Developing Pacific Scholarship provides an opportunity for younger Pacific scholars to develop their research with top colleagues at the Australian National University. The session is scheduled for January 28 through February 7, 2014. Questions? Email ssgm.admin@anu.edu.au.

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Restoring Paradise: Rethinking and Rebuilding Nature in Hawai'i, by **Robert J. Cabin**, Honolulu, HI: University of Hawai'i Press, 2013.

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ARTICLES and ESSAYS

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DISSERTATIONS

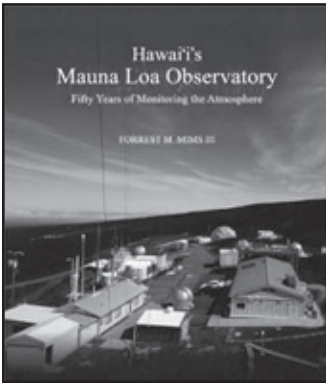
Dissertation Review (<http://dissertationreviews.org/>) provides overviews of recently defended and unpublished dissertations and articles on archives and libraries. Among the possible sections, or series of interest might be “Social Studies, Medical Anthropology and Bioethics,” which recently included the following two dissertations:

David Luesink, “Dissecting Modernity: Anatomy and Power in the Language of Science in China,” University of British Columbia, 2012;

Marlon Zhu, “Typhoons, Meteorological Intelligence, and the Inter-Port Mercantile Community in Nineteenth-Century China,” State University of New York – Binghamton, 2012.



BOOK REVIEWS



Forrest M. Mims III, *Hawai'i's Mauna Loa Observatory: Fifty Years of Monitoring the Atmosphere*, Honolulu: University of Hawai'i Press, 2012 [A Latitude 20 Publication], Pp. xiv + 461; B&W Photos. Color Plates. Appendix. References. Subject Index. Name Index. Cloth: US\$60.00 and ISBN 978-0-8248-3431-9.

C.D. Keeling's investigation of atmospheric carbon dioxide levels atop Hawai'i's second highest peak, Mauna Loa on the Big Island of

Hawai'i, is one of the critical landmarks in the history of climate science. Working with colleagues from both the US Weather Bureau at the Mauna Loa Observatory (MLO) and the Scripps Institution of Oceanography, Keeling made the first continuous measurements of carbon dioxide levels over several years in the late 1950s and early 1960s. He found not only that carbon dioxide levels fluctuated throughout the day and seasonally, but also that levels were rising every year. Keeling's first measurements in spring 1958 found the concentration of carbon dioxide to be 316 ppm (parts per million). By 2011, the concentration at MLO had risen to 393.7. Perhaps more importantly, Keeling and his collaborators Jack Pales, Saul Price, Craig Brown, Norris Rakestraw, and Lee Waterman published a series of papers in 1965 that attributed the rising carbon dioxide levels to the burning of fossil fuels. Oceans and plants, they concluded, were not absorbing the excess carbon dioxide released from the combustion of fossil fuels. This monumental conclusion changed perspectives about climate change, altered understandings about the role of human beings in the climate system, and invigorated future directions of the atmospheric sciences. Their conclusions are still at the heart of debates between the minority view held by climate skeptics and those of climate scientists.

While Keeling's famous insights are well known in the climate community, much less is known about how Keeling acquired those carbon dioxide data, how he analyzed the carbon dioxide, and – most importantly in the context of Forrest Mims' book, *Hawai'i's Mauna Loa Observatory* – what institutional, logistical, instrumental, political, economic, technical, and personal obstacles he faced in the late 1950s and early 1960s.

Mims tells Keeling's carbon dioxide story – and much, much more – in this detailed institutional history of the Mauna Loa Observatory, which opened in 1956 and is still operating today as a leading site for atmospheric monitoring. Mauna Loa (13,679 feet) is the world's largest mountain by volume if measured from its base on the ocean floor rather than from sea level. According to Mims, the first Western scientific measurements taken atop this massive volcano were in 1794, when a Scottish surgeon and naturalist, Archibald Menzies, who was part of George Vancouver's expedition, had a servant haul a portable barometer to the summit to measure pressure and determine the mountain's height. Sporadic studies and visits occurred throughout the next century and a half, including the United States Exploring Expedition in the 1830s that occurred at the same time as so many other international scientific expeditions. In the early 1900s there was interest in establishing a scientific station on Mauna Loa to study volcanology, but interest turned to weather after the 1920s.

In 1951, a dream pursued by Robert Simpson coupled with an arrangement among the US Weather Bureau, the Navy, and the National Park Service led to the establishment of a small weather station at the top of Mauna Loa. This station provided the foundation for MLO. The focus of study on Mauna Loa during the 1950s was ozone and sunlight measurements, with carbon dioxide added to that list in 1955 when Harry Wexler, Director of Research at NCAR (National Center for Atmospheric Research) suggested that “we could measure carbon dioxide there [at MLO], too. It is a site completely free of upstream pollution and at elevation, which frees it from local pollutants. This could become truly a baseline station for observing and measuring increases of CO₂ in the atmosphere” (p. 77). Obviously Wexler was exactly right given the importance of Keeling's measurements on the mountain. Mims details over many chapters not only the scientific measurements taking place at MLO, but also the bureaucratic and logistical challenges faced in the creation and running of the observatory.

The focus of this book is on the day to day struggles and activities of MLO, from its opening in the 1950s right up to the present. Mims provides extraordinary detail about who visited the observatory, what they researched, and when. He explains that researchers studied and measured weather, carbon dioxide, ozone, solar radiation, atmospheric transmission, trade wind inversion, dust, and many other topics. Mims read the guest book carefully to identify who was there at what point, and he often quotes from this log. His book is filled (almost every page) with very long quotes from the guest book, unpublished MLO papers, his own interviews with researchers and administrators, letters, and other published sources. Mims is more focused on MLO activities than on the results, application, or analysis of the measurements

and science conducted at the observatory. For historians of science interested in more critical histories, this book will not contain that critical edge. This may not be surprising because Mims was contracted by NOAA (National Oceanic and Atmospheric Administration) to write the book, though as he explains: “I was never told what to write or not to write” (p. xiii). Although Mims does not explicitly tackle STS themes or engage history of science literature in this narrative account of MLO, he nonetheless illustrates three relevant themes in our field: (1) personalities in the trajectory of science; (2) the role of institutions and bureaucracy in science; and (3) the place of instruments and measurements.

First, personalities matter in science and this book shows repeatedly how individuals shaped the course of scientific inquiry. For example, it was the paving of the road to MLO in the 1950s that allowed the observatory to open and attract researchers. In a way, then, it was Tom Vance who directed the Department of Public Institutions that facilitated MLO science – and even Keeling’s carbon dioxide measurements – because Vance came up with the plan to make an alliance with the Honolulu Lions Club and use prison labor to pave the road to MLO. In 1967, MLO director Lothar Ruhnke was successful after a long protracted struggle to get electricity to the observatory – and with power came better science. For years the staff had struggled to maintain the diesel generators running equipment at MLO. They also worried that the generators were contaminating the observatory’s carbon dioxide measurements. Ruhnke, however, made electricity a priority and worked endlessly with the state and the Hawaiian Electric Company to pay in advance and get the power lines to MLO. Measurements, instruments, computer usage, and living conditions at MLO all shifted decisively as a result of Ruhnke’s work. Mims also shows how MLO secretary Judy Bright (who later became Judy Pereira) was indispensable in the history of the observatory and thus in the science carried out there. She worked at the observatory for 34 years until 2000. She was involved in everything at the station – from organizing visitor logistics to typing scientific papers and managing research instruments. She essentially helped MLO function for more than three decades, providing key institutional memory and consistency that aided the work done there. In yet another example of personalities in the history of the station, it was director Rudolph Pueschel who ran MLO from 1970-1972, who encouraged staff to start publishing their own results instead of just collecting data. He was particularly eager to use the MLO data to respond to early 1970s papers published on global cooling. He recognized the value of the observatory’s atmospheric transmission record, which Pueschel said was “as important as the carbon dioxide trend” (p. 229). Their 1971 paper published in *Science* argued that global cooling was caused by regional factors and not global issues, thereby contradicting the global cooling studies. This is just one example to show how Pueschel’s push to

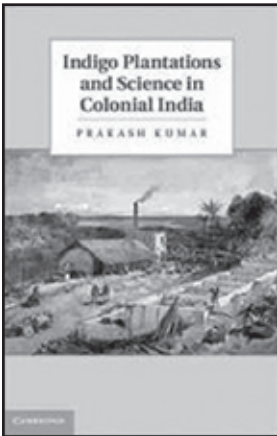
publish altered the impact of MLO measurements with far-reaching consequences for climate science.

A second theme relevant to historians of science is the book's emphasis on the bureaucracy that undergirded all the research and science conducted on this mountain. From the early struggles to establish the research station in the 1950s to the ongoing battle over budgets, staff, and resources to fund MLO, this book illustrates clearly that science occurred only when there was financial and political support from authorities – whether Hilo authorities at the base of the volcano or high-level bureaucrats in Washington, D.C. Sometimes government and financial support for atmospheric monitoring came through predictable channels. Sometimes MLO directors accomplished things because they learned how to avoid bureaucracy that could otherwise bog down research efficiency. Many times, as Mims demonstrates, the institutional influence revolved around chance encounters, lucky breaks, and outright accidents that had profound effects on the trajectory of MLO, and thus on the history of atmospheric monitoring and climate science. For example, in June 1955 Robert Simpson, a major MLO advocate and hurricane researcher for the Weather Bureau, was vacationing in New Mexico. While his daughters visited a dude ranch, he stopped at the Big Dome Observatory at Sunspot. He happened to bump into Ralph Stair at the observatory who was trying to take solar measurements but complaining about the dust storm that obstructed his view. Simpson suggested he instead go to Mauna Loa, with 340-350 unobstructed days a year to take the solar measurements. In fact, Simpson was worried about how to spend his allotment of funds for the year, and believed Stair could invigorate the MLO idea and help fulfill his budget (so he did not lose it in a subsequent year). And all that would help Stair, who readily agreed. It was in this context that Wexler also got involved, advocating for the type of carbon dioxide studies that Keeling ended up doing soon thereafter. In short, had it not been for Simpson's vacation, his institutional need to spend allocated funds, and the dust storm obstructing Stair's view, then MLO might not have gotten off the ground in the late 1950s. Serendipity intersected with institutional parameters and obligations.

A third theme in the book is the focus on instruments. For more than a half century, MLO has been a key site for measuring atmospheric conditions. Those measurements have emerged thanks to the instruments at the observatory. And maintaining them has never been easy. In the early years when they ran on diesel generators, extraordinarily intensive manpower was necessary to keep the instruments running and the measurements consistent. Staff slept at the crude station, they navigated snowy roads to get to the instruments and fill re-fuel the generators running them, and they problem-solved with ingenious solutions to fix limping

instruments over the years. In many ways, Mims shows how the research station and its instruments are at the center of the history of scientific progress. Without those instruments and the measurements they took – all operated by staff and researchers battling everything from an erupting volcano to an indifferent national governmental bureaucracy – then science would not have progressed. In other words, Keeling’s influential carbon dioxide measurements at the core of climate science research would not exist as they do now. In this narrative account of daily activities over more than a half century, Mims’ book offers some important insights into how and why science evolves as it does.

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Prakash Kumar, *Indigo Plantations and Science in Colonial India*, Cambridge and New York: Cambridge University Press, 2012, Pp. xix + 334 pp. Figures. Maps. Tables, Bibliography. Index. Cloth: Paper: ISBN 978-1-107-02325-3.

This far-ranging study of indigo culture joins a distinguished list of works examining the place of commodities in the emergence of the earth’s modern imperial and industrial order. This book possesses special interest for the ease with which it moves across geographical boundaries extending far beyond India and for its ability to interlink the agricultural and industrial realms of indigo cultivation and blue dye production. Similar to Stuart McCook’s *States of Nature* (2002) on the Spanish Caribbean, Kumar centers his attention on knowledge production and exchange, and he convincingly demonstrates the multiplicity and multivalence of knowledge systems engaged in plantation-based indigo culture within the colonized world.

Fluidity is the keyword of the first half of the book. Kumar reveals the remarkable openness of colonial scientists and planters to innovations originating among the local peasantry, as well as to practices developed on the other side of the planet. The author is nonetheless attentive to specificities of environment, technique,

and social exploitation within the eighteenth-century Caribbean where modern plantation production of indigo first took root, and even more so in nineteenth-century Bihar and Bengal where indigo's history as a global commodity reached its apogee. In Kumar's telling, these accomplishments were based on an amazingly widespread ethic of experimentalism and improvement intent on making "every field a laboratory." Readers interested in the history of agricultural science in the tropical world will greatly appreciate the book's second half, which details the personalities and projects intent on preventing indigo's decline in late-imperial India, focusing on the tense relationship between a planter-supported experiment station at Sirsiah, the state-sponsored Imperial Agricultural Institute at Pusa, and disciplinary science in Britain.

Kumar demolishes the conceit that the supposed technological superiority of synthetics produced by the late nineteenth-century revolution in industrial chemistry or the forced underdevelopment of colonized realms made the displacement of so-called natural dyestuffs a foregone conclusion. Nationalist fears emanating from the British metropole vis-à-vis growing German prominence in dye production had an important role to play in this switchover. But Kumar chooses to place the spotlight on colonial actors. Like producers of export commodities in other world regions at the time, Indian indigo planters threw themselves into the arms of scientists and the state for help in navigating these challenges. As a part of the package, Kumar argues, indigo producers undermined their own cause by embracing the reductionist obsession with quantity and purity promulgated by their distant industrial competitors.

At frequent intervals, the book presents valuable information about the soils, climates, landscapes, and social relations intertwined with indigo culture. There are times, however, when greater attention to the ecology and energetics of indigo production might have elucidated historical trends – for example, when explaining why planters preferred sun or shade drying and hot or cold extraction of dye. It is readily apparent to this reader, at least, that ecological and climatic dynamics affecting a host of other regions and commodities had a powerful influence on the denouement of this story. Growing social disturbance over peasant subsistence in South Asia, book-ended by catastrophic drought, famine, and disease in 1877-79 and 1918-19, must have played a significant role in the indigo plantation's decline – including Gandhi's strategy to start his nationalist uprising among the peasants of Bihar. Amenable climatic conditions and abundant harvests during the La Niña-prone mid-1890s temporarily helped indigo planters hold off the synthetic threat. Then, a spate of bad years (perhaps fueled by El Niño) brought on an abrupt famine in indigo supplies, helping to clear the field for synthetics. Refusing to be outdone, many Indian cultivators shifted from annual strains to a high-yielding biennial varietal

popular in Dutch-ruled Java. A monoculture in the ground for two years is inherently more vulnerable to infestation and climate extremes than a one-year crop, and a series of damp years and devastating wilt (fungus?) epidemic soon turned boom to bust. Scientists threw themselves into the struggle to identify a cause and cure, but unlike more successful colleagues in Puerto Rico and Peru intent on saving sugarcane and cotton, they were stopped in their tracks when wilt caused their experimental plots to fail to set seed in 1912, leaving them with no plants to study, forcing the closure of Sirsiah, and accelerating the demise of indigo's plantation era in India.

This final commentary should not be interpreted as a criticism of this expansive and insightful book. Just as he set out to do, Kumar provides a significant addition to scholarship on the cultural construction of science and technology in colonial contexts that problematizes the distinction between “natural” and “synthetic” and the limitations that nature poses to human aspirations. Re-inserting the environment and subalterns into the narrative will only enrich our understanding of the place of indigo in global history laid out by this ambitious book.

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SUBSCRIPTION and STAFF INFORMATION

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