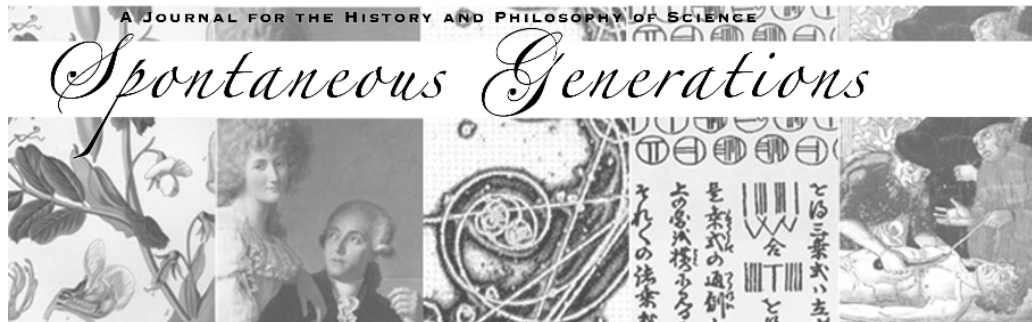




“The hidden world of science”: Nature as Art in 1930s American Print Advertising

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“The hidden world of science” Nature as Art in 1930s American Print Advertising^{*,†}

Jennifer Tucker[‡]

Photographs deployed in scientific investigation also are circulated and consumed in popular culture. Examination of the work of an early-twentieth-century consulting U.S. scientist in commercial print advertising illuminates a still mostly unwritten history concerning scientific realism, photography, and American advertising's middle-class audiences. The work of American scientific photographer Philip O. Gravelle with American national advertising campaigns during the early decades of the twentieth century draws attention to the myriad creative uses of scientific photography during the first decades of the twentieth century. It also sheds new light on a pivotal era in the evolution of illustration-based American print advertising.

Where once scientific and technical photography were marginalized in histories of nineteenth- and twentieth-century photography and science, studies over the past two decades have provided strong empirical foundations and critical frameworks for new histories of the role of photography in scientific investigation, from the early nineteenth century to the present. Questions that historians routinely ask of other objects of historical study are increasingly being applied to photographs created for the purpose of scientific exploration: what were the historical conditions of production and circulation? How were photographs used, interpreted, and, later, reinterpreted by others? What epistemologies authorized (or undermined) photography's uses? What sorts of meanings did photography compel, for which viewing audiences, and with what results (Daston and Galison 2007; Geimer 2002; Keller 2008; Nowotny and

* Special thanks to Cara Dellatte, Archivist, Staten Island Museum History Archives and Library, for assistance with the archival materials consulted in this research. Parts of this research were published previously in: J. Tucker, Let the Microscope Tell Your Story, *Photoresearcher* 17 (Spring 2012): 19-32.

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Weiss 2008; Tucker 2006; Wilder 2009)? Two key historiographical questions stand out for historians interested in the history of the visual cultures of science: how are historical understandings and stories about science altered or transformed by putting analysis of visual images at the centre? Conversely, how are perceptions of the history of visual arts and communication enlarged or revised by considerations that incorporate findings from the rich histories of science?

Photographs are construed as scientific not only due to how they are deployed in scientific investigation but also because of the particular ways in which they are circulated and consumed within popular culture. The work of one early-twentieth-century consulting U.S. scientist in commercial print advertising, for example, illuminates a still mostly unwritten history concerning scientific realism, photography, and American advertising's middle-class audiences. The work of American scientific photographer Philip O. Gravelle with American national advertising campaigns during the early decades of the twentieth century compels attention to the myriad creative uses of scientific photography during the first decades of the twentieth century. Assessment of his photographic output also sheds new light on a pivotal era in the evolution of illustration-based American print advertising.

"INDUSTRY'S NEW EYE THAT SEES AND SOLVES"

Philip O. Gravelle was a popular scientific celebrity whose innovations with camera and microscope received wide coverage in the popular press during the 1930s. A pioneer in the use of magnification, dyes in negatives, and polarized light to make photographs of microscopic phenomena, he was also a prominent nature photographer and the first non-English scientist to win, in 1923, the prestigious Barnard medal. This medal, awarded by the London Photographic Society, was the highest achievable honor in photomicrography. Gravelle's photographs of microscopic phenomena, which graced hundreds of glossy corporate print advertisements during the late 1920s and 1930s, pioneered new modalities of photography in American advertising.

Philip Octavious Gravelle was born in San Francisco, California, in 1877. A textile designer by profession, his interest in the chemical processes of textile manufacture, together with his interest in photographic chemicals, led him to study chemistry at Pratt Institute and Columbia University. Around 1900, he moved to South Orange, New Jersey, where he resided for the rest of his life and where, like many inventors and amateur hobbyists of his time, he set up a home laboratory for his professional and amateur pursuits with microscope and camera (Figure 1). As a free-lance industrial microscopist, he made his living on commissions he received from industries and other organizations, including forensic science and police units. Early in his career, Gravelle invented a technique that became widely adopted in the forensic investigation and

identification of firearms used in crimes, using a comparison microscope to make side-by-side comparisons of bullets. This innovation allowed an investigator to view a whole specimen rather than individual cells, which otherwise would have been difficult until the invention of the scanning electron microscope in 1952. Gravelle later adapted the technique to the observation of three-dimensional specimens. "Life and Death Hinge Upon His Photos as South Orange Scientist Aids Police," blazed one newspaper headline in 1934.

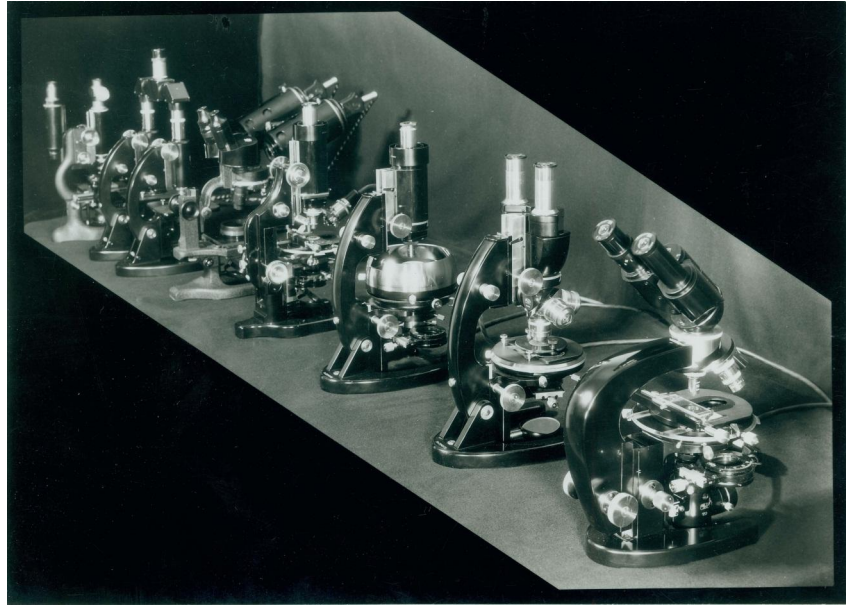


Figure 1. Phillip Gravelle. *Philip Gravelle's microscopic apparatus*, "The Light Benders," ca. 1935, gelatin black-and-white print, 12.1 x 17.8 cm.

Gravelle began working as a free-lance industrial microscopist at a time when photomicrography was being widely hailed as a boon to industrial manufacture. An article about Gravelle written for a popular science magazine in 1927 boasted that Gravelle's "astonishing skill with microscope and camera" had "opened new industry" (Blocki 1927, 47-48). From 1920 through the 1940s, he worked for over one hundred corporate industries supplying photomicrographs to manufacturers of razor blades, textiles, phonographic records, paints, cosmetics, and newspapers, to name just a few. As scores of manufacturing corporations around this time began turning to consulting scientists and engineers for help detecting flaws in materials and to gain knowledge about their behaviour, industrial manufacturers turned occasionally to independent technical consultants, such as Gravelle, for help detecting and diagnosing flaws in materials and for knowledge about the behavior of materials that provided a competitive advantage (Teale 1934, 24-26). In "Industry's New Eye that Sees and Solves," published in 1924, a journalist for *The New York Herald Tribune* praised Gravelle's contributions to industry, remarking that

"[i]ndustry has been given a new eye with which to look into itself." Evoking the imagery of the psychiatrist's consulting room, the journalist noted that since the beginning of the "big business" era, there had been a "marked tendency toward industrial introspection," with industry increasingly seeking "the aid of science in uncovering unknown and disturbing factors which impede its progress." Some idea of the sheer "variety of industrial problems presented to the photomicroscopist," the article continued, could be gathered from the "aid given by Gravelle, the microscope and photography to the phonograph industry and to the plaster of paris manufacture" (Propper 1924, 10-11).

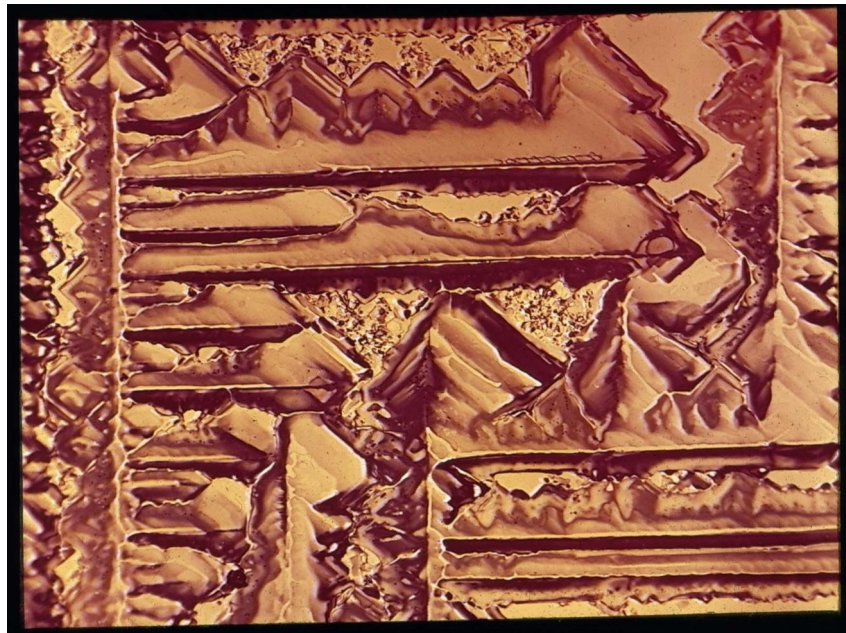


Figure 2. Phillip Gravelle. *Oriental*, c. 1920-1935, lantern slide negative of Potassium Chlorate obtained with microscope, polarized light, and dyes on negative, 8.3 x 10.2 cm, magnification 85.

As well as being a known consultant for industry and crime labs, Gravelle also quickly became established as a popular science writer and a nationally recognized nature photographer who wrote and gave talks for popular audiences locally. His photographs of marine creatures, minerals, and plants seen through the microscope and camera were borrowed and reproduced widely by other naturalists and popular science writers in places ranging from the Museum of Natural History in New York to the new glossy popular interest mass-circulation magazines *LOOK* and *Life*. Gravelle's passion for making photographic illustrations of subvisual phenomena through various arrangements of microscopes and cameras had roots in his hobby of nature photography. Alongside his consulting work, he was a popular lecturer who gave hundreds of illustrated popular slide lectures about "nature viewed under the microscope" to civic organizations, local microscopical societies,

photography clubs, and gardening groups (Teale 1934). Lantern slides of Gravelle's photographs of crystals, viewed under a microscope and polarized light, resemble in their appearance fractal and Polaroid art that developed in later decades (Figure 2). He also made hundreds of slides of organic compounds. For instance, he prepared slides of adipic acid, which rarely occurs in nature but which from an industrial perspective was (and remains) the most important dicarboxylic acid, which is used mainly as a precursor for the production of nylon (Figure 3). In addition to his still photographs, he also made teaching films about nature on subjects ranging from the life cycle of the rotifer to the circulation of the blood to the behavior of the amoeba and other microorganisms. These last were culled from a pool in his garden (Teale 1934, 25-26).

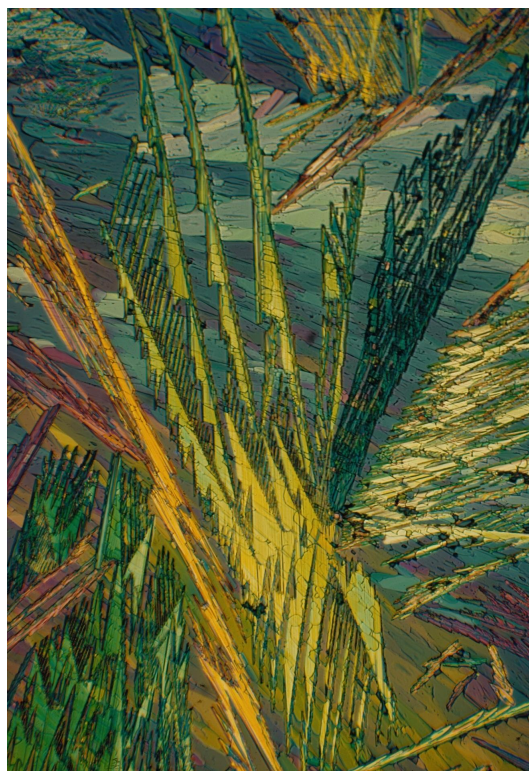


Figure 3. Phillip Gravelle. *K4416 Salicylaldoxime-Adipic acid*, 1920-1935, lantern slide negative obtained with microscope and submitted to *Life* magazine, 12.7 x 17.8 cm, magnification 75.

A surviving manuscript in the Gravelle Collection at Staten Island Historical Institute, originally intended by Gravelle for publication, contains over three hundred photographs and accompanying text with captions. Gravelle provisionally titled his manuscript "Symmetry and Structural Design in Nature (Animal, Vegetable, Mineral)." The unpublished manuscript contains one hundred and fifty pages of text and over three hundred photographic

illustrations of objects selected from a "diminutive world of great diversity and form, living at the present time and from the past." Written for a popular audience, Gravelle emphasized the general nature of the work and what he called its "esthetic approach," a phrase that evokes contemporary discourses of architectural modernism in the physical and visual revelation of the patterns of "Symmetry and Structural design" which Nature had "devised." The images Gravelle chose for the manuscript manifest the range of a diverse subject unified through a common focus on the simple terms of geometrical symmetry and the construction of both animal and vegetable structures. His photographs of marine invertebrate specimens using illumination by transmitted light, staining, and magnifications from twenty-five to two hundred and fifty, displayed symmetry, bilaterism, and geometric forms (Figure 4). In Part II ("Vegetable Life"), Gravelle included photographs of diatoms as found in nature and as arranged to "form pleasing designs," as in the following figure (Figure 5). Part III ("Minerals") contained photographic specimens of microscopic objects observed by incident light and different illumination techniques.

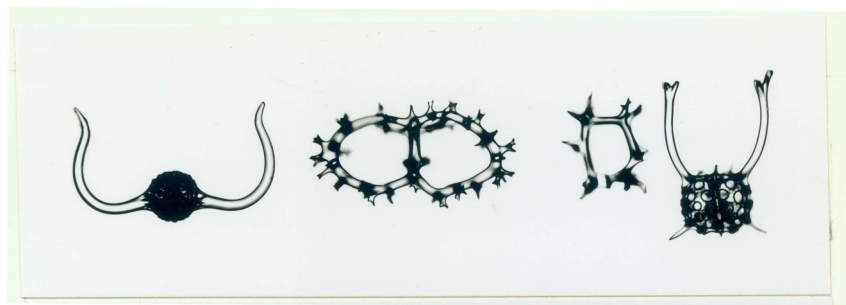


Figure 4. Phillip Gravelle. *Radiolaria from Barbados*, 1920-1935, black-and-white gelatin print using transmitted light and microscope, 4.4 x 12.1 cm, magnification 116.

Gravelle's unpublished manuscript stands as a rare example of what was frequently described at the time as "Ultra-Microphotography" under scientifically exacting conditions in the years prior to the electron-scanning microscope. His innovations in popular scientific photography of microscopic nature for mass audiences have been eclipsed by the later work of Hungarian émigré, Fritz Goro, the talented photographer whose *Life* magazine series, *The World We Live In* (1952-1954) with the science writer Lincoln Garret still tops the list of best-known popular science writing of the twentieth century (Gould et al. 1993). However, Gravelle's work was exemplary in its time of photographic expertise in modern popular scientific reportage. For the historian, Gravelle's life and interests provide a window into the surprising and often unexplored links that connected microscopic optics, photography, amateur nature study, and the world of commercial advertisement and manufacturing interests in the 1920s and 1930s.

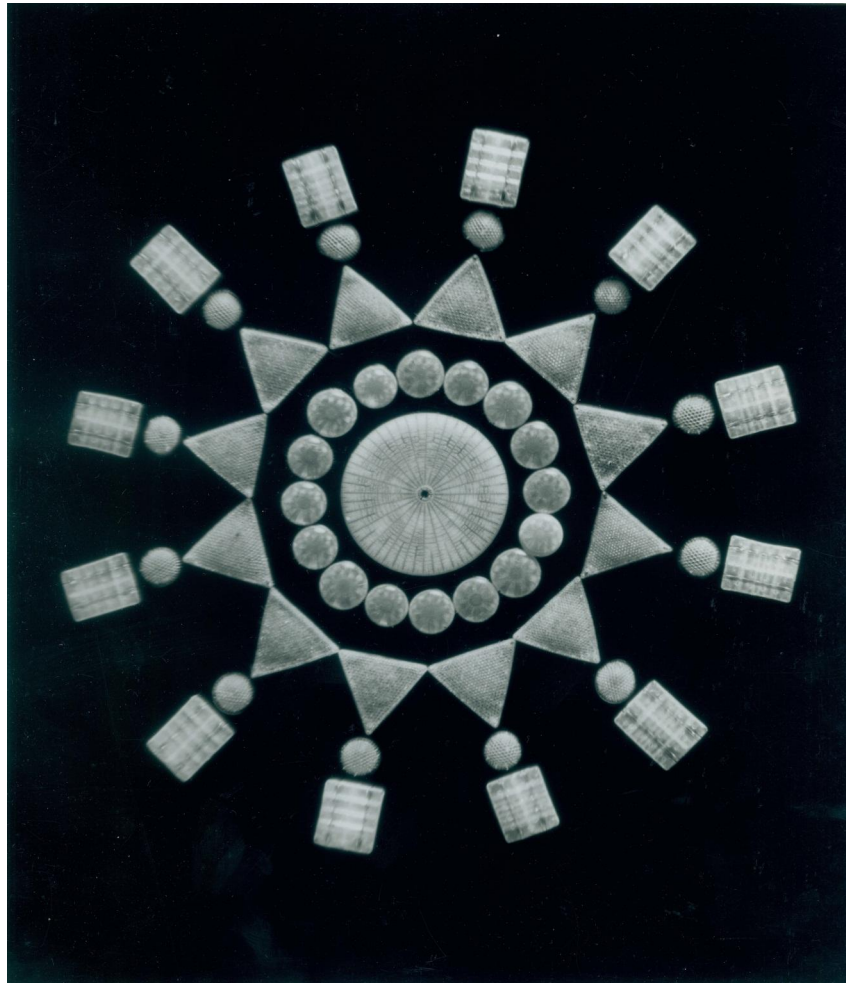


Figure 5. Phillip Gravelle. *An arrangement of Recent Marine diatoms and a Recent Fresh-water form, *Terpisiinöe musica* around the outer edge of the preparation (c. 1891) by J.D. Möller, obtained with incident light, 19.2 x 22.2 cm, magnification 120.*

Gravelle’s photomicrographs offer a lens through which to reconstruct the historical and cultural contexts that engendered new public meanings of “snapshots of the invisible” in the early twentieth century, an era of protean creativity and innovations with the scientific camera in which the “snapshot” of everyday life itself became familiar in popular culture (Nickel 1998). The remainder of this essay will consider his contributions to scientific photography in modern American print advertising. Preliminary historical assessment of this work suggests that in both his industrial work and his amateur nature studies, Gravelle had a core interest in the underlying symmetry and structural design in nature. This interest clearly carried over to his advertising work.

RATIONALIZING CONSUMPTION

During his career, Gravelle actively took up various roles in relation to different participants in the process of bringing nature photography, industry, and commercial advertisers together, negotiating differing perspectives and concerns in the process. He acted in what Peter Galison might term a "trading zone," a metaphor often applied now to describe collaborations between science and industry, when representatives of different cultures (e.g. physicists and engineers or, in this particular example, scientific consultants and Madison Avenue) are able to exchange goods, despite differences in language and culture (Galison 1997). Although Gravelle was internationally known as a skilled photomicrographer, it was also his eye for modern forms of design in structures of both living and non-living matter that informed his photographic aesthetic, from his popular scientific writing and illustrated lectures on nature photography to his response to the demands of the new age in advertising. Susan Star and James Griesemer have noted the important and often overlooked role of individuals who facilitate communication across a cultural divide or boundary, translating information and mediating between different domains (Star and Griesemer 1989, 387-42). Gravelle's life and work perhaps illustrate in a similar way how visual objects bridge the boundaries erected between different scientific fields, partly because they satisfy the needs of different social groups.

During the 1930s, Gravelle was highly sought-after as a commercial artist for national advertising campaigns promoting industries for which he had provided consulting services. Using an elaborate and technically sophisticated arrangement of microscope and camera, he made magnified pictures of silk, tobacco, soap, yeast, coal, milk, metals, pencils, pens, razor blades, mayonnaise, cod liver oil, ink, cocoa, shoe polish, runs in stockings, and women's facial creams, among other commodities: a visual cornucopia of, in T.J. Jackson Lears's terms, America's "fabled abundance" (Lears 1995). Gravelle's clients included New York City advertising agencies such as the George Batten, Frank Presbrey, and Lord, Thomas and Logan companies, as well as over forty laboratories and industrial organizations. His photographs of objects viewed at high magnifications under the microscope were reproduced in high-end American magazines, especially women's magazines, as part of national advertising campaigns run by corporations ranging from Pond's Facial Cream to Waterman's Pens (Figure 6). Some examples of his work may be seen together in the pamphlet, reproduced in the figure cited above, that he created containing reduced illustrations of nationally advertised products "showing the use of Gravelle Photomicrographs."

Gravelle's status as a scientist not only helped legitimize his use of photography in commercial illustration during the 1930s, it also provided him, paradoxically, with a rich visual vocabulary that met advertisers' increasingly stringent demands for abstraction, emotion, and story-telling. Gravelle began



Figure 6. Eberhard Faber. *Greatly reduced illustrations of Nationally Advertised Products showing the use of Gravelle Photomicrographs*, printed promotional pamphlet, c. 1935

making scientific photographs of subvisual phenomena for corporate advertising campaigns in an era of profound changes in American business and advertising industries. American industry was producing thousands of consumer goods by the 1920s. The rapid growth of mass-appeal advertising, from radio to magazine print, meanwhile, paralleled the mass production of goods (Brown 2005; Leach 1994; Lears 1995; Strasser 2004). Advertising agencies that had formerly bought advertising space in local newspapers and a few magazines began working for the new national advertisers, placing advertisements in places most likely to attract buyers' attention, especially in the scores of new mass-circulation magazines. Roland Marchand has shown how large companies, from General Electric to Metropolitan Life Insurance to Du Pont Chemicals, strove to counter public condemnation of corporations as dangerous leviathans in the country's first decades by assuring consumers and politicians that they posed no threat to democracy or American values (Marchand 2001). Corporate leaders turned to advertisers to develop new rhetorical and visual imagery to connect their corporate image with Main Street and small-town America. In Jackson Lears's phrase, their purpose was to "surround mass-produced goods with an aura of uniqueness" designed to stimulate consumption through the promise of individuality (Lears 1995, 270). According to one estimate, corporate advertising rose from a total volume of \$200 million in 1880 to nearly \$3 billion in 1920.¹

¹ See P.W. Laird, *Advertising Progress: American Business and the Rise of Consumer Marketing*, *Spontaneous Generations* 6:1(2012)

Photography enabled many early twentieth-century American advertisers to achieve their objectives. Achieving great sales in an increasingly competitive national marketplace required convincing hesitant consumers that individual difference and personal meaning could be theirs, despite a regularized landscape of standardized goods. In her groundbreaking essay about the entrance of photography into modern American advertising, Elspeth Brown discusses the ways in which the uses of photography in American advertising changed from the 1890s through the 1920s (Brown 2000). She shows that, although some advertisers made use of photographs in American advertising after the success of the ten-cent magazines ushered in the halftone screen process during the 1890s, it was nearly twenty years before most national advertisers abandoned pen-and-ink illustrations in favor of photography, in spite of photography's availability at a greatly reduced cost. Indeed, despite the fact that halftone technology made such illustration economically advantageous, Brown notes, photographic illustration was generally avoided by American print advertisers before 1913.

What was the problem? According to Brown, photography's value as the preferred medium of efficient rationality, with its faithful reporting of material fact and enthusiasm for endless detail, became a distinct liability as advertisers began to shift their model of the typical consumer from a rational to an emotional buyer at the beginning of the twentieth century. Brown writes: "Whereas earlier advocates of American productive efficiency, such as the motion-study experts Frank and Lillian Gilbreth, had championed the use of photography in rationalizing the working body in production, by the 1920s the influence of applied psychology had reoriented managers toward an appreciation of the mind as the critical element of rationalized consumption" (Brown 2000, 716; Brown 2002). Early mass-circulation advertising photography had corresponded with advertisers' belief that consumers made purchase decisions on a rational basis; advertisers initially used photography to make a logical, persuasive argument concerning the product's superior merits. Often referred to in the industry as "reason-why" copy, photographs were sometimes used in portrait-based ads, in which personal testimonials stood in for the salesclerk.

However, although advertising never abandoned "rational man" or reason-why copy completely, Brown explains that advertising's role "changed from educating consumers about a product's merits to creating desire through the "stimulating of impulses, instincts, and emotions." Advertising increasingly required the merchandising not so much of the product itself but of the benefit the product offered. Advertisers, Brown demonstrates, needed to "tell a 'striking

(Baltimore: Johns Hopkins University Press, 2001); and M.M. Manring, *Slave in a Box: The Strange Career of Aunt Jemima*, (Charlottesville, VA: University of Virginia Press, 1998).

or interesting story' through dramatic lighting, harmonious composition, balanced use of lines and visual contrast, and other formal elements that had been considered more the province of the artist than of the photographer." As the leading industrial psychologist, Walter Dill Scott, remarked: "We have been taught by tradition that man is inherently logical, that he weighs evidence...and then reaches the conclusion on which he bases his action. The more modern conception of man is that he is a creature who rarely reasons at all." Advertisers needed to "tell a 'striking or interesting story' through dramatic lighting, harmonious composition, balanced use of lines and visual contrast, and other formal elements that had been considered more the province of the artist than of the photographer" (Brown 2000, 724-25).

As advertising shifted toward more abstract and impressionistic copy, photography seemed unsuitable for idealist representation because of its faithful reporting of material fact and enthusiasm for endless detail. David Nye and Jennifer Green-Lewis have discussed how the factual style of presentation was especially attractive in industrial photography (Green-Lewis 1996; Nye 1985). By 1913, it was clear what advertisers wanted of illustrations, and photographers seemed unable to meet the demand. As one contemporary observer stated in 1918, the "almost unavoidable realism of photographic illustrations as usually made killed the effective impression demanded of the picture used to illustrate a story... An illustration must get away from this very definite thing and give to all classes of readers an idealistic vision of the hero or heroine of the book or story" (Brown 2000, 724). Promoting the short story or the emotional benefit promised by the consumption of mass-produced goods, the innovative advertising work of a group of photographers that included Lejaren à Hiller and, later, Edward Steichen and Clarence White borrowed aesthetics from fine art and techniques from pictorial photography. It was they, among others, who established photography as a medium suitable for communicating the complex visual and narrative strategies required by the social tableaux advertising of the period (Brown 2000, 718). Hiller, for example, used a soft-focus lens and employed methods such as retouching and combination printing, as well as the use of toy models and the construction of complex interior sets and social tableaux, similar to those used for illustrating fiction.

"THE MARVELS OF ULTRA-MICROPHOTOGRAPHY"

If high-end magazine advertising's shift toward impressionistic copy and pictorialism helped to condition photography's acceptance as a medium in American advertising during the 1910s and 1920s, the success of Gravelle's photographs of material reality viewed at high magnification under the microscope seems at first hard to explain. The photographs in Gravelle ads lacked soft-focus and retouching. They avowedly depicted nature "as it was," only more visually accessible. Why then did national advertisers turn to him,

repeatedly, for photographs?

A few ads selected from national advertising campaigns to which Gravelle contributed during the 1930s clarify why the scientific camera met advertisers' shifting demands and ushered in novel ways of deploying photographic views in commercial print ads. Scientific photography—long associated with popular narratives of science—was capable of carrying a good story. Lorraine Daston and Peter Galison have shown how photographic representations of phenomena have long conveyed new ways of seeing and describing nature as art (Daston and Galison 2007). Photomicrographs accompanying popular science articles about the hidden wonders of science in mass-circulation newspapers and magazines during the 1920s certainly prepared the way for Gravelle's advertising attainments. For example, a popular science article entitled "Marvels of Ultra Microphotography," published in *The World Magazine* in August 1924, boasted that reproduced slides of diatoms, insect scales, and sea cucumbers appeared as "marvelously beautiful patterns when photographed by the powerful lenses of modern microscopes" (Figure 7). Enlarged up to seven hundred times, the reproduced slides of diatoms especially were reminiscent of a "kaleidoscope." Indeed, the article went on, "[t]he beauty of the diatomaceous forms has led many microscopists to make patterns of their tiny skeletons, mingled with other forms found in the ultra-small world" ("Marvels of Ultra Microphotography" 1924).

A typical magazine ad using Gravelle's photographs led the viewer's eye to a photomicrograph of a commodity (e.g. the point of a lead pencil or night cream). Rather than being visually unified around a central image or set of images, his photographs tend to be scattered across the page, leading the viewer's eye dynamically across the page, potentially raising interpretive questions. Readers were invited to see for themselves what the modern microscope and camera revealed about everyday products, including their most intimate toiletries. Moreover, with their abstract views and patterns of underlying microscopic realities, the way the mechanical recording of visual facts became joined with artistic and pictorial photography in the new advertising appealed to the subjective realms of emotion and psychology. For example, an ad for Faber lead pencils boasted that "THESE AMAZING PHOTOGRAPHS TELL THEIR OWN STORY." The advertising text frequently encouraged viewers to place their trust in a commodity because of what the photomicrograph showed and asked viewers to draw their own conclusions about the product's efficacy and manner of working after viewing the microscopic evidence for themselves: as one ad put it, "[t]he Microscope Shows *Why* Peter's gives better results." The convention of the "before and after" photograph, with origins in nineteenth-century philanthropy and medicine, became central to commercial advertising: a photograph of the point of an "ordinary" surgical needle was juxtaposed with a similar photograph of an improved "atraumatic" needle. In

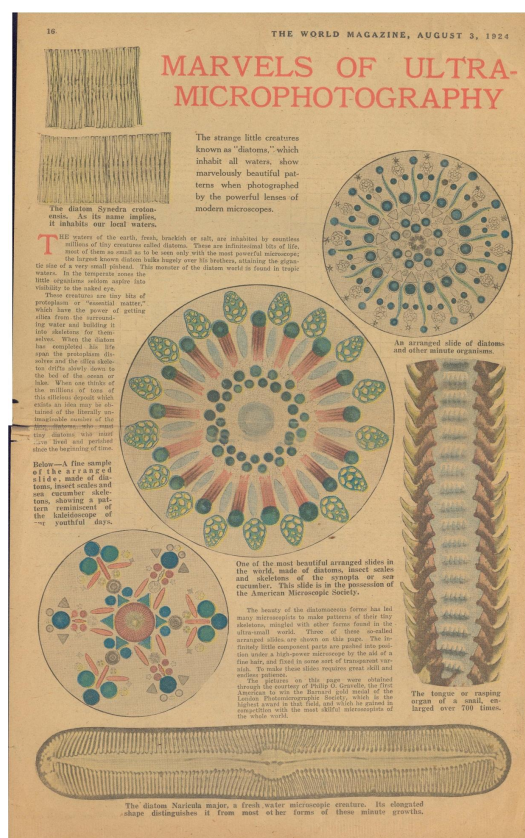


Figure 7. Author Unknown. Reproductions of microscopic organisms, circa 1924 in *Marvels of Ultra Microphotography*, *The World Magazine* (Aug. 3, 1924): 16.

another ad, a photomicrograph of yeast in an “ordinary” yeast cake was shown next to a brand name (“Tastyeast”) yeast cake “[f]or purpose of comparison” (Gravelle ca. 1935).

Advertising appeals in these ads stressed not the subjectivity and artistry of the photographs but their “unretouched” quality: their lack of artistry adduced their power as visual proof. Many of the ads included a photograph of Gravelle himself, peering through a microscope in a white laboratory coat. Perhaps to ward off any distancing impression that prospective buyers might form from the perceived coldness of material recordings of scientific fact, advertisers emphasized the brand’s personal connection to prospective buyers by means of a direct address to viewers: an ad for Waterman’s pens reads, for example, “Waterman’s *made this MICROSCOPE TEST for you.*” A mass-reproduced advertisement for Proctor and Gamble from the 1940s is especially interesting for the way it linked Gravelle’s photographs, his public image as a professional modern scientist, and his celebrity within the amateur world of nature study in the service of promoting a mass-consumer good. Titled “Philip O. Gravelle and The Hidden World of Science” (subheaded “Famous Scientist shows Little

Mary Strange Sights under his microscopes"), the colour cartoon strip presented a series of vignettes in which what begins as a child's induction into the world of natural marvels seen through a microscope concludes with Gravelle, sporting a white laboratory coat, showing the child character Mary's mother how the scientific microscope discloses new facts about how "ordinary Laundry Soaps fail and why white Proctor and Gamble gets clothes whiter" (Figure 8). The ad includes drawings based on photographs representing magnified appearances of fabric, both before and after being washed with Proctor and Gamble soap.

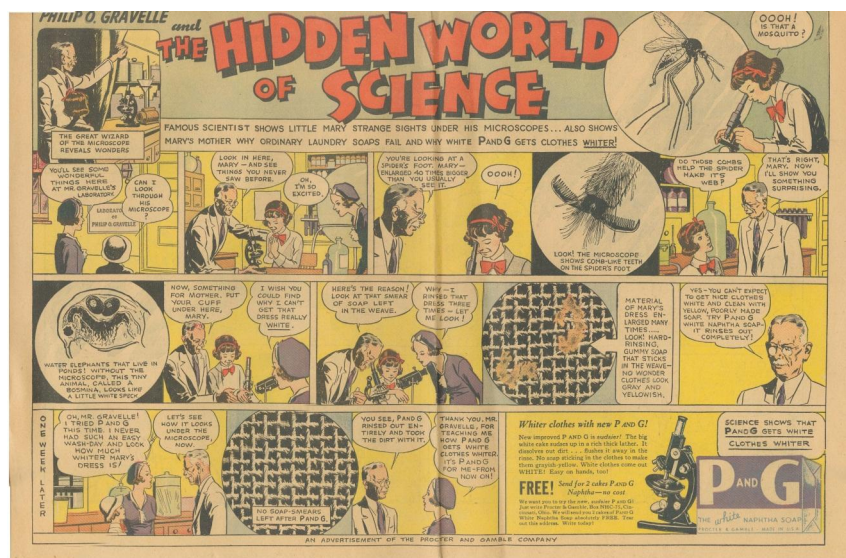


Figure 8. Proctor and Gamble. *The Hidden World of Science*, c. 1945, color cartoon advertisement for Proctor and Gamble, 26 x 39.4 cm.

CONCLUSION

While Gravelle's work was indebted to a longer historical tradition of photomicrography and scientific visuality that dated back to the mid-nineteenth century, this essay has argued that his work must also be seen as representing novel practices in early-twentieth-century commercial science and art. More research is needed not only on Gravelle's archive but also on the relations between scientific visual rhetoric and imagery and capitalism in the advertising age. This topic is especially important for histories of the Depression years, during which corporations turned to advertisers and designers as never before to circulate propaganda for public relations. This essay has considered one example of how new markets for scientific images opened up with the rise of print advertising in early-twentieth-century mass-circulated illustrated picture magazines. Putting scientific photography at the centre of the analysis of American advertising promises to add new insights into the visual cultures

of American business and the complex relations between scientific visual representation and new forms of capital production.

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