

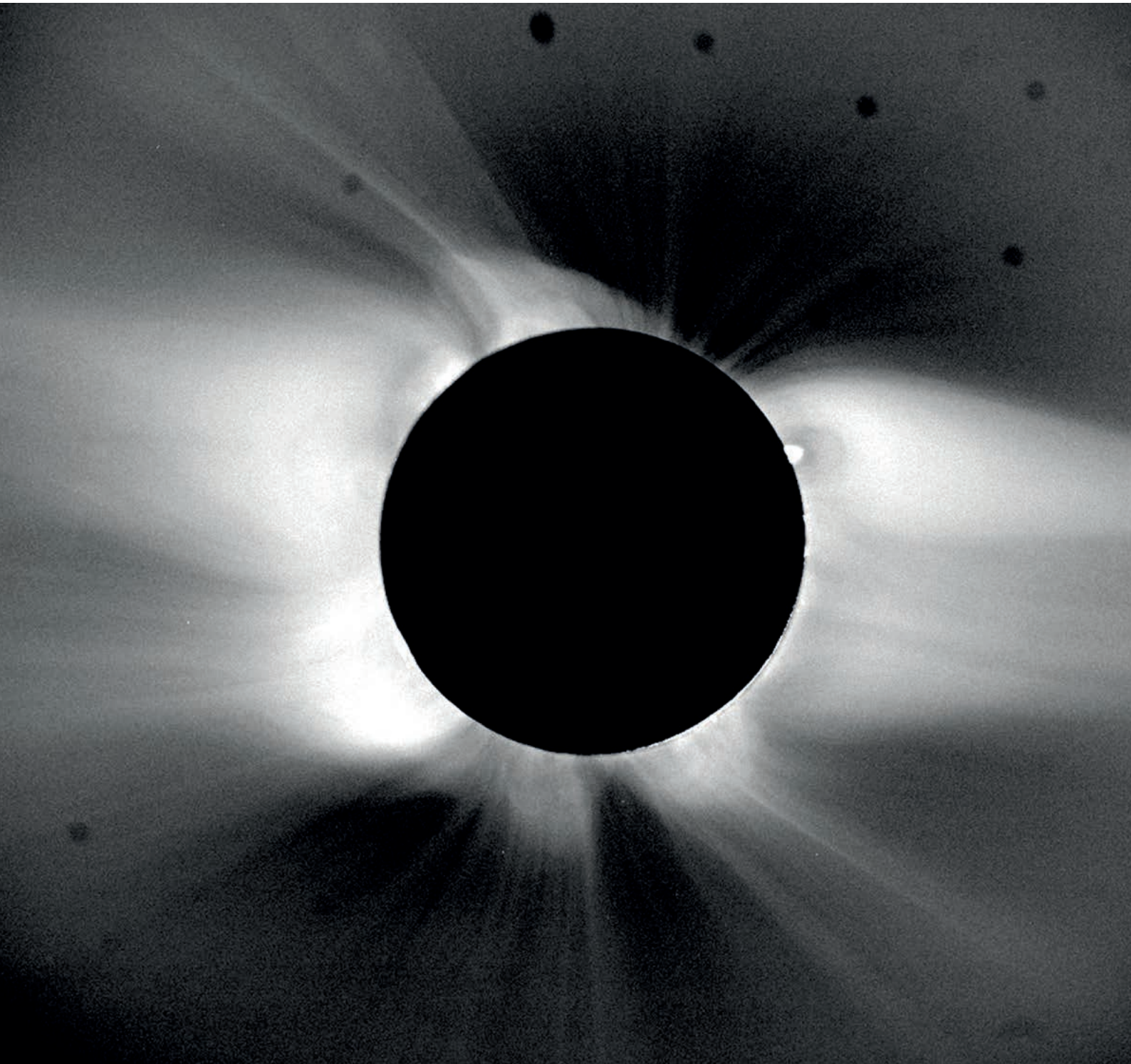
# UMĚNÍ 3 ART

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EDITOVANÉ ČÍSLO O FOTOGRAFII A VĚDĚ / SPECIAL ISSUE ON PHOTOGRAPHY IN SCIENCE  
 EDITORKY / EDITORS: BARBORA KUNDRAČÍKOVÁ, FEDORA PARKMANN

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 by Space, 2013/2021**

fotografická instalace, archivní digitální tisk /  
 photographic installation, archival digital print

Photo © Katarína Poliačiková

Vážení čtenáři,

Fotografie se v posledních letech stala jedním z ohnisek výzkumu v dějinách umění i podnětem pro jeho metodologické reflexe, jak ve svém úvodu upozorňují editorky vyzvané k sestavení právě předkládaného čísla časopisu. To vzniklo v návaznosti na konferenci Photo : Science / Fotografie a diskurzy vědy, uspořádanou v roce 2020 Centrem pro výzkum fotografie ÚDU AV ČR. Hostující editorky Barbora Kundračíková a Fedora Parkmann připravily na jejím základě pro *Umění / Art* výběr textů, které zachycují proměny vztahu mezi fotografií a vědeckým výzkumem, a to nejen v oblasti dějin umění, ale také společenských a přírodních věd. Texty ukazují, jak byl a je tento vztah obohacující nejen pro výzkum fotografie jako média, ale i pro reflexi postupů dějin umění jako vědy. Poté, co dějiny umění svými metodami dlouho podporovaly etablování specifického oboru fotografie, se tento vztah od osmdesátých let 20. století postupně měnil a obracel. Následující texty zaměřené na rozmanitá témata a problémy každý svým způsobem ukazují, jak se vzájemná reflexe vztahu mezi fotografií a vědou promítá do rozšíření záběru fotografických studií, a naopak jak analýza nejrůznějších druhů fotografických snímků včetně jejich materiality či objektivit obohacuje naše uvažování o vizuální kultuře.

Přejeme vám poutavé a přínosné čtení.

Za redakci,  
Pavla Machalíková, šéfredaktorka časopisu

Dear readers,

Photography has, in recent years, become one of the focal points of research in art history and a stimulus for its methodological reflections. The editors invited to compile the current issue of this journal draw attention to this tendency in their introduction. It originated in connection with the conference 'Photo: Science/ Photography and Scientific Discourses' organised in 2020 by the Centre for Photography Research of the Art History Institute of the Czech Academy of Sciences. Based on this, guest editors Barbora Kundračíková and Fedora Parkmann prepared a selection of texts for *Umění/Art*, texts that capture the changes in the relationship between photography and academic research in the field not only of art history but also of the social and natural sciences. The texts show how this relationship was and is enriching not only research into photography as a medium, but also reflections on the procedures of art history as a science. After art history had by its own methods long supported the establishment of a specific discipline of photography, from the 1980s this relationship gradually changed and reversed. The following texts, focusing on a variety of themes and issues, each in its own way shows how mutual reflection on the relationship between photography and science is projected into the expansion of the scope of photographic studies while, on the other hand, an analysis of very different kinds of photographic images, including their materiality and objectivity, enriches our consideration of visual culture.

We wish you an engaging and rewarding read.

On behalf of the editors,  
Pavla Machalíková, editor-in-chief



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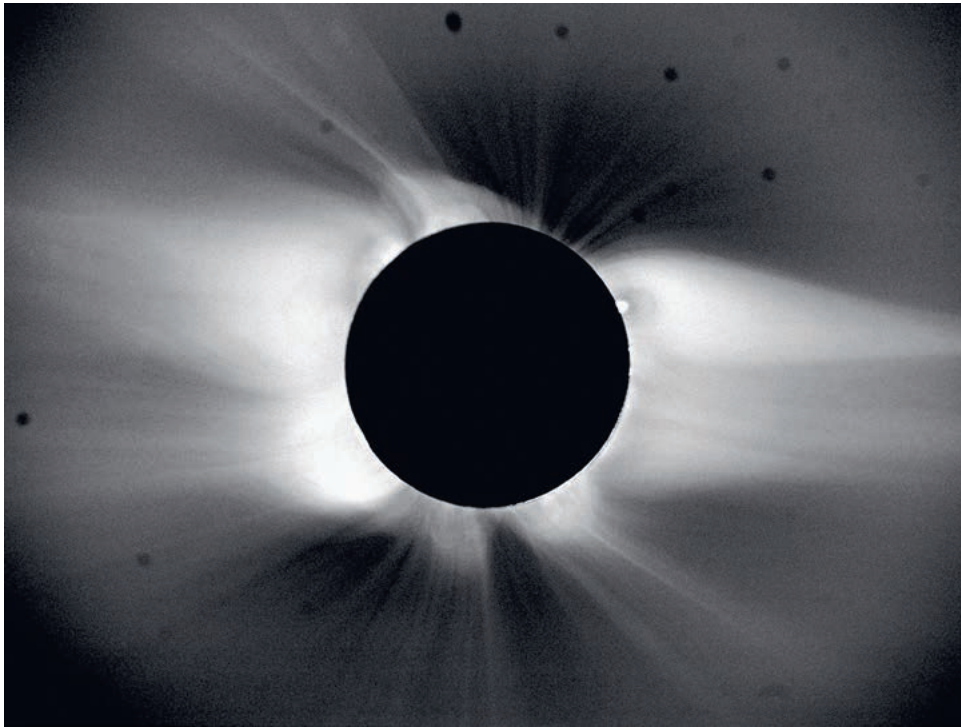
# Photo: Science: Art History. Mutual Interactions in the Era of a New Universalism

The art-historical perspective that had been so essential to the formation of the field of photography studies between the 1930s and 1980s has long since been surpassed. A reversal of the relationship between the two disciplines has even occurred, with scholars suggesting today that the methods and objects specific to photography studies could enrich art-historical inquiries.<sup>1</sup> The roots of this phenomenon trace to the beginning of the 1980s. At that time, photography scholars began to transcend analytical frameworks and art-historical concepts such as the masterpiece, style, or the author, which had been fundamental to Beaumont Newhall's long canonical *The History of Photography*.<sup>2</sup> Turning away from art museum prints, photographic scholarship ventured instead into the uncharted waters of visual documentation and experiments in science, medical imagery, court records, and exploration photography.<sup>3</sup> This new interest in scientific or, to put it more broadly using James Elkins's terms, 'informational' or 'non-expressive' photography<sup>4</sup> coincided with developments in the history of science itself, which saw sociologists of science such as Bruno Latour or Steve Woolgar turning away from the history of ideas and toward the study of scientific practices and their visual sources.<sup>5</sup> One of the consequences of this methodological turn was the establishment of scientific photography itself as an object of historical and theoretical inquiry.

The question of the different roles that photography assumes in the natural and social sciences has since then generated a substantial body of scholarly work.<sup>6</sup> It is driven by two main lines of inquiry: on the one hand, how the use of photography helped scientists redefine their discourses and investigation methods, and, on the other hand, critical examinations of the epistemologies that the use of photography in science is based on. The first

direction has most often resulted in historical surveys of photographic illustrations used in science or in examinations of the dissemination of scientific images in journals or books.<sup>7</sup> Beside charting the uses of scientific images and their typologies, there have been critical examinations centred more specifically on the cultural values attributed to the photographic image in science. These led to more complex narratives of how photography and science constituted themselves as independent practices in dialogue with each other.<sup>8</sup> While the most famously investigated topic was the notion of objectivity and its controversial association with the photographic medium,<sup>9</sup> other skills allegedly specific to photography, such as observation<sup>10</sup> or trust, also attracted scholarly interest.<sup>11</sup>

Another consequence of the emergence of scientific photography as an object of study was the advent of a multiplicity of vantage points on photography, which originated most often in sociology, anthropology, literature, and history, but also in geography, cosmology, informatics, and other scientific disciplines. Although such plurality of theoretical frameworks, methods of investigation, and subjects further complicates the establishment of photographic studies as an academic discipline, according to Gil Pasternak, this 'intellectual diversity' could nevertheless be viewed as one of the strengths of the field.<sup>12</sup> In recent publications, it has translated into broad overviews of the various material vehicles and discursive containers through which photography shapes our knowledge and experience of the world, ranging from the anthropological document and image banks to photographs used as courtroom evidence. Based on such dataset, it has been argued that the practices of making, storing, and circulating



1 / Katarína Poliačiková, *The Way Geologists Liberated in Time, She Thought, Astronomers are Freed by Space*, 2013/2021  
 photographic installation, archival digital print  
 Photo © Katarína Poliačiková

photographs are also part of what constitutes photography as documentary, beyond its solely formal and representational properties.<sup>13</sup>

These new scholarly orientations develop on the backdrop of one of the general demands of the last decades, which is to transcend the bi-polar, paradox-based modern culture<sup>14</sup> — while, with the help of revised post-structuralism, allowing for a more flexible, more element-conscious critical system. A reflection on the interrelationship between science and art, which perhaps best represents this shift, moreover, on the ground of the ‘modern medium itself’, photography, can help us decide whether this form of ‘new universalism’ is potentially realistic, or under what circumstances it can be approached. In recent years, many attempts have been made to fulfil the basic requirement of interdisciplinarity, both on the side of artistic practice and theory, and in the context of the natural sciences. However, whether it is the framework of ‘artistic research’, the newly developed educational strategies of the STEM type (combining Science — Technology Engineering — Mathematics), but even more so STEAM (with the addition of Arts), or the progressively more concrete realization of the so-called hard sciences that they can no longer do without visual semantics or other types of data organization, the result so far is a rather ‘weak’ universalism.<sup>15</sup> Like all other attempts to recapture and deconstruct the canon in a broad sense, including canonized critical practices, new universalism remains more of a challenge. However, it is precisely the wide-ranging disciplines of photographic studies that follow directly from it, because ultimately, they cannot do otherwise.

The aim of this issue is precisely this — to reflect the methodological and disciplinary diversity of the scholarship currently dealing with the interplay between the photographic medium and scientific research in the natural sciences, the social sciences, and the humanities, while also questioning what art history could gain from these exogenous approaches toward the visual. Initiated by the visual studies in the 1970s, the tendency to encompass a vast array of images has had a great impact on art history, opening it to forms of creation considered minor until then, such as folk art, street art, or new media. Photographic production, and especially scientific photographs, were another pool of images that historians of art could draw on to widen their field of inquiry. The next step was to extend art-historical methods to these non-artistic images. One prominent example of applying art-historical issues such as iconography and style to scientific imagery is the work of Horst Bredekamp within the field of *Bildwissenschaft* (the science of images), with results such as his famous demonstration of the relevance of the image (and symbol) of coral to Darwin’s evolutionary theory.<sup>16</sup>

Much of the scholarship and the scientific events that deal with the interplay between photography and science today are occurring within the field of art history, while also borrowing from the visual studies questions about what images do and how concretely they are made to perform. In 2019, the St Andrews Photography Festival and symposium on science and photography revisited the classical issues of how photography was used in science and how these uses in turn informed artistic practice<sup>17</sup> — the latter topic being to this day a favourite

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of photo-historical exhibitions<sup>18</sup>. In the Czech context, the exhibition ‘Czechoslovak astrophotography’ featured among others works the photographs of Katarína Poliačiková. [1] By bringing together views of space from a 1980s Slovak astronomical publication and identical views from the 2013 NASA archive, Poliačiková draws attention to the transformation of the photographic vision of scientists in time. Distancing itself from artistic concerns, the workshop ‘The Economy of Images in the Sciences’ organized at the National Institute of Art History in Paris in 2021 centred more specifically on the impact of economic concerns such as the cost and value of scientific images on the production of knowledge.<sup>19</sup> In the Czech academic sphere, the crossed epistemologies of photography and science were the subject of two conferences. In 2013, the Department of Art History and the Centre for Visual Studies and History of the Image of Masaryk University and the Moravian Gallery in Brno organized a conference to accompany the ‘Images of the Mind’ exhibition focusing on Bildwissenschaft as one of many attempts at a universalistic grasp of the problem of the image.<sup>20</sup> On that occasion, attention was also paid to the question of the aestheticization of the image in scientific practices and the possible theorization of this practice. Later, in 2020, the Photo: Science. Photography and Scientific Discourses conference was organized by the Photography Research Centre at the Institute of Art History of the Czech Academy of Sciences.<sup>21</sup> The opening lecture, given by a member of the Event Horizon Telescope

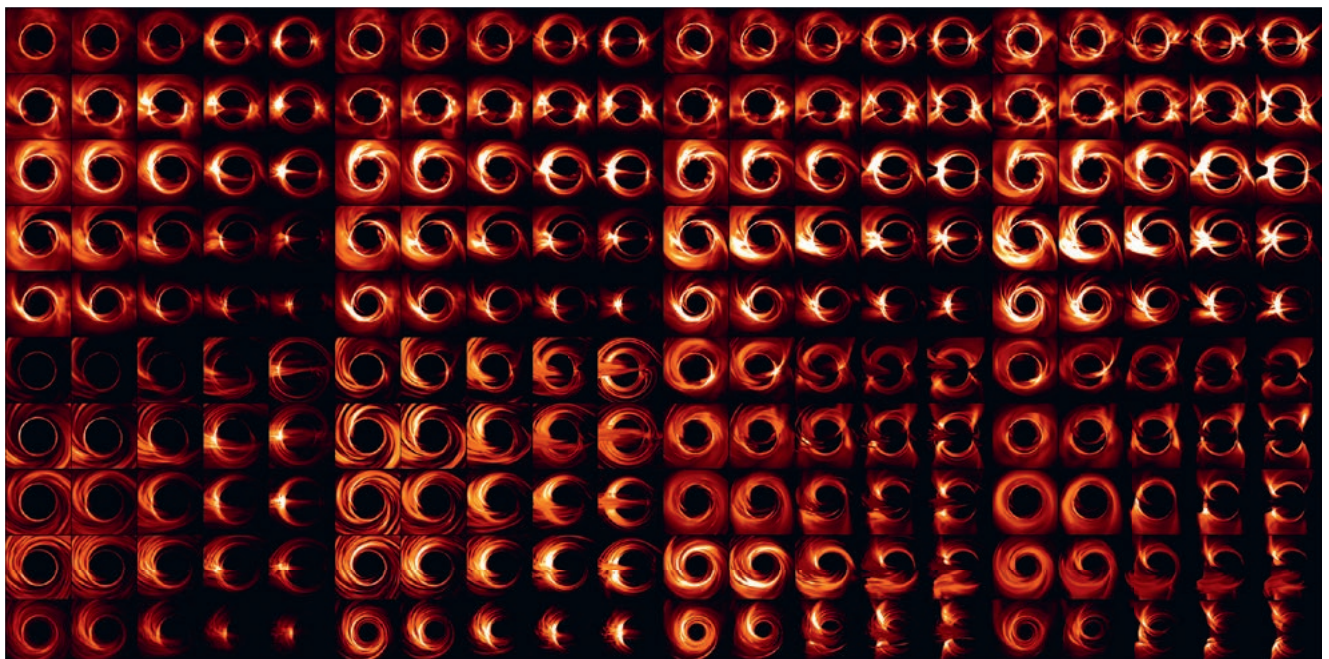
(EHT) team, Maciej Wielgus from Harvard University, revived the issue of the secondary construction of the scientific image. [2] The EHT produced the first image of a black hole at that time,<sup>22</sup> which shows a radiating oval object in shades of yellow, orange, and red. In this form, it is presented as a fact — as an approachable and researchable entity. This colouring, however, does not depict its real tones. It does not represent its state of existence but is an interpretation based on the principles of aesthetics, or rather formalism applied randomly. Aesthetics thus provides an ideal basis for thinking about the standards we use in applying strategies of long outdated visual research methods.

Aesthetics is one of the modern disciplines that took shape at the end of the eighteenth century while engaging with the sensorial experience preceding cognition and reasoning about the external world — and with the systematization as well as presentation of its gains. Its echoes can be traced in contemporary cognitive sciences, and it is still the basis of philosophy and critical theory of art, while nowadays it reflects also everyday practices as well as natural processes as such. It continues to explore the principles of value judgements, even though we are increasingly confronted with the notion of post-truth. The approach described above, as well as the use of the word *randomly*, is of course somehow radical.<sup>23</sup> The point of this remark is not to criticize the obvious but to extend the field and reconnect art and the sciences by bringing the technology to the spot. Science in the sense

**2 / A graphic produced by the Event Horizon Telescope during the creation of the first image of a black hole, 2020**

Graphic showing a sample of numerical simulations compared to the observational data used to train the imaging algorithms

Photo © Event Horizon Telescope





of visual observation, after all, has been *passé* for at least a century, and interest in the media itself and in ways of sharing findings continues to grow.<sup>24</sup>

When Douglas Davis reflected upon technology as a primary artistic motif of the modern era in 1973,<sup>25</sup> he was referring to its mediacy, the connection between media and the specific forms of communication they adopt, where artistic practises play a significant role. The linear perspective on which also photography was founded and continues to operate even today was named as the prime issue here, substantially influencing not only how technology works but also its communicability. Although it seems ‘natural’ and was accepted as an artistic and realistic means of ‘true’ perception, it has deep symbolic meaning.<sup>26</sup> And despite the ‘transformation of the psychophysiological space into a mathematical structure,’ it still works, in Gottfried Böhm’s words, as a medium for the ‘implementation of facts.’<sup>27</sup>

Rationality, which is found at the core of modern science, is now — thanks to the above-mentioned Bruno Latour and others — understood much more as a dynamic relationship between complex conceptual and cognitive operations and their visualization. The same approach is applied to the interdependence between art and other disciplines, as photography also clearly shows. Since its invention, photography has become a central visual tool not just in the natural sciences but also in the military world and in legal practice, all while still further evolving as an art form.<sup>28</sup> This is the reason we are interested in the work of Robert Koch, not just because of his findings on bacteria, or that of superintendent Hugh Welch Diamond, not just because of how well he documented the Female Department of the Surrey County Lunatic Asylum in 1850s.<sup>29</sup> The ‘scientific recording’ or inscription which transmits laboratory data into a visual document gives them visibility. At the same time, it makes these data part of the visual world, which is governed by a different set of rules. This makes both domains internally dependent. On the level of a structural correlation, the proximity of art and science is not an ontological fact — but it is continually produced using their mutual instruments.

As stated in a recent article illuminating how astrophysicists approach the medium of photography, the formal issues in the sense of the organization and presentation of data collected were already recognized as such, although no theory was provided yet:

*‘When creating these images, we are in essence converting what a telescope can see into something we can see. It’s a fundamental challenge because our telescopes observe objects that, with few exceptions, are invisible to our eyes. ... Using artistic principles of design and composition, we can create images that highlight the scientific structure within an image by using the color and intensity contrasts that the human eye uses to understand detail within an image. [...] With visual grammar, one can imply qualities that a two-dimensional image intrinsically*

*does not show, such as depth, motion, and energy. However, it is important to be aware of the differences between scientists and the public in how they interpret and understand images. When done properly, these images can be scientifically illustrative as well as aesthetically pleasing for both audiences.’<sup>30</sup>*

Imagery, especially photographic images, plays an important, yet complex, role in helping to communicate scientific findings.<sup>31</sup> As we can see, the ‘pleasing’ element has also been recognized as a vital tool aiding not just in understanding, but also in disseminating knowledge as such. This element cannot be overestimated. From documents of climate change to medical scans and electron microscopy, none of these images qualify as prosaic ‘records of the real’, but always rather as their representatives, as research on scientific photographs has shown to date.<sup>32</sup> Art history still has much to learn from these findings and from the way photography scholars approach the varied images and visual objects produced in connection with scientific research. Conversely, we may ask what tools and resources specific to art history can inspire photography research.

In response to this question, this issue gathers papers that were initially presented at the above-mentioned Photo: Science conference. These five different case studies of images within scientific research rely on a wide range of methodological approaches drawn from visual studies, anthropology, the history of science, and geography. By doing so, the authors, most of whom were initially trained as art historians, work to extend the disciplinary boundaries of art history.

Martin Jürgens focuses on the early stages of the technology of photography and its use in the context of scientific illustration. In his study, he re-enacts the first microscopic examinations of daguerreotypes with two historical compound microscopes. He argues that it was primarily such early examination of daguerreotypes under a microscope that allowed media pioneers to devise the first theories about image-forming processes and the final microstructure of the Daguerreian plates, which then, in turn, led them to develop etching methods that would convert the daguerreotypes into intaglio printing plates.

To establish a discursive framework, Kelley Wilder discusses photographs and science notebooks in general, arguing for a concept of expanded notebooks to understand how photographic and scientific practices interact. She uses the notebooks of William Crooks and Herman LeRoy Fairchild to analyse this interaction while arguing that the ‘notebook’ should be considered in the same way as the boxes, catalogues, or collections through which scientists formulate their perspectives and posit theories about what readers should see, which are then mirrored in scientific publications.

This process is reflected on a larger scale also by Anaïs Mauuarin, who recapitulates some of the positions

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that French anthropology took in the past while it realized the aesthetic potential of visual sources and photography. She shows that the Musée d'Ethnographie du Trocadéro (1928–1935) and its replacement, the Musée de l'Homme (from 1938 onwards) gave unprecedented space to photographs in public rooms and exhibitions, and highlights the museums' growing concern for the creators of these works. According to her findings, photographs helped to expand public interest in anthropology as scientific, media and aesthetic tools worked together at that time.

Magdalena Vuković and Andrea Fischer shed new light on the history of scientific practices in physical geography by focusing on the work of Austrian geographer Friedrich Simony (1813–1896). In 1895, he published his investigation of the Dachstein glaciers in the Northern Alps, using photographs to demonstrate geomorphological processes. Vuković and Fischer emphasize the novelty of his approach, in comparison with the work of professional photographers such as the Bisson brothers or Gustav Jägermayer, who had climbed the highest peaks of the Alps as part of costly

expeditions since the 1860s. But contrary to Simony, their photographs were hardly suitable as illustrative material because their aesthetic aspects overshadowed scientific ones.

The closing argument comes from Nadiia Kovalchuk, in her investigation of the relationship between scientific knowledge and creative photography. The work of Ukrainian photographer Oleg Maliovanov from 1969 to 1975 provides a case in point of the way in which new photographic technology in science, in this case equidensities, can benefit art photography. For Maliovanov, scientific innovation provided not only a new formal device but also a vehicle for undermining the then official artistic dogma of realism and of photography as a faithful reflection of reality.

The disruptive power of photography continues to be felt to this day, whether in science, art, or art history. A revision of the relationship between art history and photography studies seems necessary and is already underway. For it hopefully turns out that the latter domain does indeed have something to offer us.\*

## NOTES

1 Matthew S. Witkovsky, 'Photography as Model?', *October*, No. 158, Fall 2016, pp. 7–18.

2 Beaumont Newhall, *The History of Photography*, New York 1982. First edited as an exhibition catalogue in 1937.

3 The photo-historical surveys that first covered these aspects are Michel Frizot (ed), *Nouvelle histoire de la photographie*, Paris 1994. — Mary Warner Marien, *Photography: A Cultural History*, New York 2002.

4 James Elkins, 'Art History and Images that Are Not Art', *The Art Bulletin* LXXVII, No. 4, December 1995, pp. 553–571.

5 Bruno Latour and Steve Woolgar, *Laboratory Life: The Social Construction of Scientific Facts*, Princeton 1979.

6 See the overview articles and their bibliographies by Charlotte Bigg, 'Les études visuelles des sciences: regards croisés sur les images scientifiques', *Histoire de l'art*, No. 70, July 2012, pp. 95–101. — Christian Joschke, 'Images et savoirs au XIXe siècle', *Perspective*, No. 3, 2007, pp. 443–458. — Jennifer Tucker, 'Photography and the Making of Modern Science', in Gil Pasternak (ed), *The Handbook of Photography Studies*, London 2020, pp. 235–254.

7 Geoffrey Belknap, 'From a Photograph: Authenticity, Science and the Periodical Press (1870–1890)', London 2016.

8 Jennifer Tucker, *Nature Exposed: Photography as Eyewitness in Victorian Science*, Baltimore 2005.

9 Lorraine Daston and Peter Galison, *Objectivity*, New York 2007.

10 Lorraine Daston and Elizabeth Lunbeck (eds), *Histories of Scientific Observation*, Chicago 2011.

11 For an overview see Kelley Wilder, *Photography and Science*, London 2009.

12 Gil Pasternak (ed), *The Handbook of Photography Studies*, London 2020, p. 11.

13 Gregg Mitman and Kelley Wilder (eds), *Documenting the World: Film, Photography, and the Scientific Record*, Chicago 2016.

14 Comp. Bruno Latour, *We Have Never Been Modern*, Cambridge (Mass.) 1993.

15 The basic arguments are summarised by Boris Groys, 'The Weak Universalism', *E-Flux*, No. 15, April 2010, <https://www.e-flux.com/journal/15/61294/the-weak-universalism/>, 29. 8. 2022.

16 Horst Bredekamp and Darwins Korallen, *Frühe Evolutionsmodelle und die Tradition der Naturgeschichte*, Berlin 2005.

17 Symposium 'Science & Photography', St Andrews Photography Festival, 23 October 2019.

18 See Jan Dibbets and François Michaud (eds), *La Boîte de Pandore* (exh. cat.), Musée d'Art moderne de la Ville de Paris in Paris 2016. In the Czech context, see also the exhibition 'Československá astrofotografie' by Hana Buddeus, Fotograf Gallery in Prague 2021.

19 Worskhop 'The Economy of Images in the Sciences', Paris, Institut national d'histoire de l'art, 28.–29. 10. 2021.

20 Art History and Bildwissenschaft: Interfaces, interactions, antinomies, Department of Art History & Centre for Visual Studies and Image History, Masaryk University and The Moravian Gallery in Brno, 28–29. 3. 2013.

21 The conference was held remotely between 30. 12.–2. 12., see all the papers: <https://www.youtube.com/channel/UCAwQCIoBPCXG6o1TVm4IEiA>, 19. 6. 2022.

22 The photograph was immediately presented in the daily press. See, e.g., Hannah Devlin, 'Black hole picture captured for first time in space breakthrough', *The Guardian*, 2019, 10. 4., <https://www.theguardian.com/science/2019/apr/10/black-hole-picture-captured-for-first-time-in-space-breakthrough>, 19. 6. 2022.



**23** We are guided by the cultural tradition we live in — and in our culture, shades of red and rounded shapes have latent meanings, suggesting warmth and a centralized structure. This is probably also how they are understood in the context of the ‘universal’ natural sciences, which seem to accept the Western tradition in this respect.

**24** Comp. Catelijne Coopmans, Janet Vertesi, Michael E. Lynch et al. (eds), *Representation in Scientific Practice Revisited*, Cambridge (Mass.) 2014.

**25** Douglas Davies, *Art and the Future. History/Prophecy of the Collaboration Between Science, Technology and Art*, London 1973.

**26** Erwin Panofsky, ‘Die Perspektive als Symbolische Form’, in Hariolf Oberer and Egon Verheyen (eds), *Aufsätze zu Grundfragen der Kunstwissenschaft*, Berlin 1974, pp. 99–168. — Peter Gendolla, ‘Zur Interaktion von Raum und Zeit’, in Peter Gendolla (ed), *Formen interaktiver Medienkunst*, Frankfurt am Main 2001, pp. 19–38.

**27** Gottfried Böhm, ‘Vom Medium zum Bild’, in Yvonne Spielmann and Gundolf Winter (eds), *Bild-Medium-Kunst*, München 1999, p. 172.

**28** Infrared photography may be one good example of this synchronous development since it was intensively developed during World War I and then used by Hollywood filmmakers as well as the progressive art scene of the 1960s. For a comprehensive survey of how modern art and science (including science photographs) overlap,

see Linda Dalrymple Henderson, ‘Writing Modern Art and Science: An Overview’, *Science in Context* XVII, No. 4, pp. 423–466.

**29** Jochen Hennig, ‘Vom Experiment zur Utopie. Bilder in der Nanotechnologie’, *Bildwelten des Wissens. Kunsthistorisches Jahrbuch für Bildkritik* II, 2004, No. 2, pp. 9–18. — Sigfried Zielinski, *Archäologie der Medien. Zur Tiefenzeit des technischen Hörens und Sehens*, Frankfurt am Main 2002.

**30** Travis A. Rector, Zoltan G. Levav, and Lisa M. Frattare et al., ‘The Aesthetics of Astrophysics: How to Make Appealing Color-Composite Images that Convey the Science’, *The Astronomical Society of the Pacific CXXIX*, March 2017, No. 975, p. 14.

**31** Jean Trumpp, ‘Seeing Science: Research Opportunities in the Visual Communication of Science’, *Science Communication* XXI, 2000, No. 4, pp. 379–391. — Elizabeth A. Kessler, *Picturing the Cosmos: Hubble Space Telescope Images and the Astronomical Sublime*, Minnesota 2012.

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