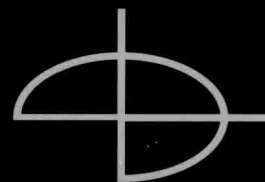


R E S E A R C H



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F I R S T I N T R I G U E :

THE CIGARETTE PHOTO OF GABRIEL LIPPMANN 1894

Sherlock Holmes' use of the magnifying lens for detection is more than a symbol of close scrutiny. More than just making things larger to identify or examine, the step into that enlarged world alters the observer so that what is observed changes the process of thinking because we have a new point of reference. On studying the photograph of Gabriel Lippmann in his lab with the stereo camera, one immediately sees a posed man common with photography at that time because of the very slow film speed, somewhat self conscious and particularly awkward, the extreme awkwardness accentuated by the cigarette in hand which usually now is to denote casual un-self consciousness, cool, detached, pretended unawareness of the camera recording that moment.

But if you consider the cigarette as a badge of office, an essential tool of observation by a physicist already recognized throughout the scientific world and the photographic community, it works as a deciphering device to make you realize that the cigarette is there as part of the list of tools which surround Lippmann on this photo opportunity. Lippmann three years previously has exhibited full colour photographic plates at the Sorbonne, made by a unique process, discovered by him and still the only direct colour photo process that has been successful.

Steiglitz saw the plates either when they were exhibited in 1891 or shortly after in 1892 and corresponded with Steichen in a letter about the vivid colour and clarity of the images.

These various tools that surround him indicated new avenues of thought for his creative mind. Indeed, we know that at the time of the photograph he

LLOYD CROSS, optics and holography researcher, first showed me the tradition of how cigarette smoke is commonly used in the study of optics. The electro-optical and holography fields seemed to have no alternative for easily seeing the diffusion and pathways of light. Complete darkness was not always sufficient. The gradual fogging of optics and mirrors was an acceptable if begrudged trade-off.

LIPPMANN'S *papers on integral photography*:

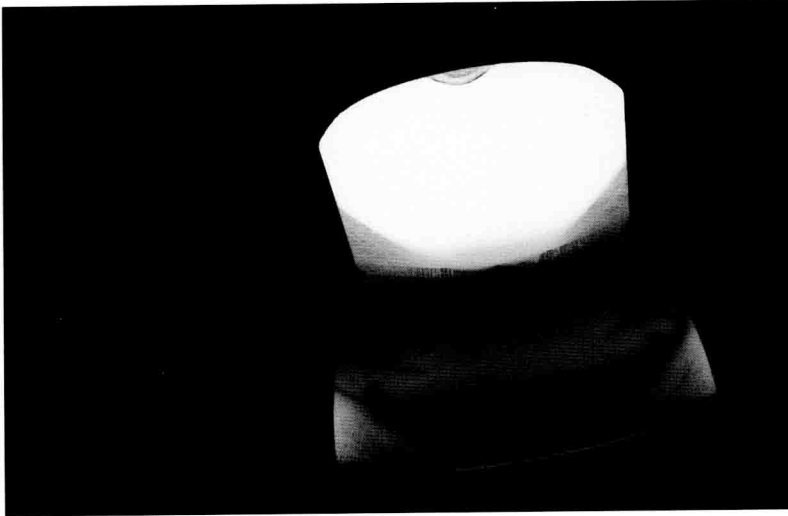
Comptes Rendus, 1908, 146, 446, 451; "Epreuves reversibles donnant la sensation du relief", Journal de Physique, Vol. 7, Nov. 1908, 4th Series, pp.821-825; "Procès verbaux", Société Française de Physique, 1911, p. 69.

HERBERT E. IVES, *American researcher, states in his paper in 1931 that the two methods which Lippmann proposes in one of his 1908 papers are not equivalent as Lippmann claimed. Only one method appeared correct.*

had been working on at least one new theory since the colour process work for which he would be awarded the Nobel Prize in 1908. His inclusion of the plate holder in the foreground on his bench is indicative of the attempt to show not just himself but his work and his world. I believe the glass plates that are in the plate holder, a wooden rack for the drying stage, are probably some of the famous colour plates made by using the interference of light to create colour. I have yet to see those plates to verify the size and experience the vividness which one hopes is still apparent. Lippmann seems to have been a physicist who had the ability to create experimental evidence of his important thoughts, and also had an immense theoretical grasp demonstrated by his published work on integral photography between 1908 and 1911, this basic work being the beginning of real unrestrictive dimensional imaging. The concrete evidence of the blackboard for optical calculations, the electro-chemical inclusions and accoutrements on the bench are expected, even a stereo camera which is the harbinger of a theoretical jump only if we know what is to follow. This photo represents for me the steps and the mystery of the work which leads him and us to the theory of integral photography.

The hard solid evidence of the tools with the wild inventive theoretical mind leaves one guessing about the visual construct of such a complicated vision as the fly's eye lens system of photography, fostered by visual research. The idea translates through the certainty of work progressing from stereo pairs with the camera, to not only any number of optical pairings (lens and images), but then also to the perception of optical clarity with this lens array forming a single large image with illusory dimension. The mystery is the questions left over. In Lippmann's published work he assumes some conclusions which researchers point out as incorrect but eventually, in 1961, Robert Pole at Bell Labs proves Lippmann's integral photography work.

Conceptually the stereo camera in the photo would lead one to believe, as I had believed originally, that the hypothesis of integral images probably was based inadvertently upon the actual negative size used in the camera, and



that it was not a grand shift in concept from the popularity of stereo viewers in Victorian society. But on reading and following Ives' paper, criticisms and analyses, one realizes that the fabric of Lippmann's thinking is not contained by what is technically possible in his time and that the theoretical scope of such thinking based on the optical behaviour of light, eye and image could only be satisfied at the time by mathematical formula and the parameters of optical limitation. When I mention that this work by Lippmann's is the heart of unrestrictive dimensional reconstruction, I think it's because the theoretical limits are not yet understood as he perceived it, there is an undefined doorway to illusory constructs that I haven't understood as yet and I can only think that the strange absence of Gabriel Lippmann's name in the history of photography must be due to an incomprehension of both his important landmark discoveries: full colour photography utilizing the interference of light which is the basis and the essence of holography, and the theory of integral photography that takes stereo imaging from its infancy into the future, and what we surely will come to realize as an essential pictorial restructuring which offsets the physical limitations of finite space.

"In 1908 Professor G. Lippmann suggested a novel method for making photographs without the use of a camera - pictures which should, moreover, change their appearance with the position of the observer, and so show stereoscopic relief from all directions and distances. The special means proposed consisted of a sheet of transparent material embossed with a multitude of small convex lenses, each of which formed a minute picture upon the photographic emulsion on the rear surface. When such a sheet is held before the eye a composite or integral image, as Lippmann called it, is seen, a single tiny element of each minute picture being seen from any given position, and since the elements seen change with the position of the eye, the character of the integral picture changes as the observer moves. If the minute pictures are properly oriented and positioned one should see a virtual re-creation of the object in space. This idea of Lippmann's, while never reduced to practical form, has been generally conceded to constitute an ideal solution of the problem of securing stereoscopic vision without a stereoscope". From "Optical Properties of a Lippmann Lenticulated Sheet" by Herbert E. Ives, Journal of Optical Science of America, Vol.21, March 1931, pp.171-176

S E C O N D I N T R I G U E

WHILE LOOKING FOR SOME RECOGNIZABLE IMAGE IN THE RACK OF plates, wondering if those were indeed the full colour photos that Lippmann had exhibited in 1891 at the Sorbonne, or were they additional ones made in the three-year period since then, I happened on the image of the man with his hands behind his back, a subject of determined posture necessary to keep still for those lengthy exposures. There seems to be a blemish in the centre of his torso.

Perhaps these plates are just badly exposed rejects but they have been carefully wrapped and then opened for the photo session, at least that's what their presentation in the illustration suggests.

I had considered that the illustrator had done the work for *La revue des beaux arts* from the only photo of that session that I had seen. I'm assuming now that there were more than one, so I refer to the photo reproduced here as 'the cigarette photo'. With closer looking it seems the artist has included things in the illustration that weren't quite discernable from that specific photo, and some things like the pen in the ink well and the clock were omitted. The artist probably accompanied the photographer, in fact it was probably a joint undertaking both for visual documentation and written reportage. In the illustration, wrapped and boxed plates rest in the drying rack, and a single odd-sized plate has replaced the cigarette held by Lippmann – the necessity to show the separate plates in the rack has lessened, and now one plate is featured as the achievement and central issue of the image. I suspect now that the scene in the drawing may have occurred as depicted, early in the session, but then later on the plates were unwrapped and after some explanation of the usefulness of cigarette smoke as a tool for

BEAUMONT NEWHALL

writing in the chapter, "Partnership by Correspondence", refers to Nicéphore Niepce: "He was also using glass plates in an effort, he said, to imitate the effects of the Diorama. He discovered, to his astonishment, that some of his images showed colors, which he attributed to the interference patterns known as Newton's rings. Although he never succeeded in recording all the colors of the spectrum, he clearly defined the problem which Gabriel Lippmann, in 1891, was to solve with an interference process of color photography." In *Latent Image*, Doubleday & Co, 1967, pp.37-38.

Recently I have been interested in when the Sorbonne installed electricity.

Which year? And the clock, could it be an electric clock? Even before standard time was adopted in France?

Everything ran from Paris time with increments as you got further away.

[See The Culture of Time and Space by Stephen Kem, Harvard University Press, 1983].

observing the behaviour of light, the photo of Lippmann standing with his cigarette was taken. It does seem likely that he would have taken the time to show the plates of spectral colour, and explain the principles of the colour inherent in soap bubbles and the refractive colours we associate with the rainbow, consequently an illustration became the visual tool to best describe what couldn't be shown by black and white photo documentation.

The soap bubbles and the two rainbow images, the illustrator at the top right and the rainbow on the plate itself that Lippmann holds, are used to show the reality of the statement at the bottom of the page: "Le professeur, l'inventeur de la photographie en couleurs, dans son laboratoire."

Perhaps during the daylight shooting session the clock could be interpreted as reading ten minutes to twelve because of the two dark marks at the edge of the photo emulsion. It seems that if the clock had shown an afternoon or early morning time it would have been apparent on the clock face. Even as fuzzy as it is, the clock marks on the blackboard look distinct enough in white on black, therefore surely the clock face with bold black on white would have been readable. I think now, since studying some photocopies of the image, that the clock hands were moving through a three minute exposure and that the photo was taken at twenty-five to five, a dark and difficult time except during the summer or late spring or early autumn.

When you magnify the space, which gives the sensation of viewing three dimensionally because it gives the convergence cue to the brain, you are also a little more aware of wanting those other requirements of spatial realism. Where is the light coming from? Why are the shadows so dense? The drawer in the foreground, the shadow beneath the exhaust hood, and the deep shadow of the table overhang and the stool under the table all suggest a large skylight which was common not only in artists' north light studios but most places that needed good light before the advent of electricity. The reflections on the neck of some of the chemical bottles also suggest overhead illumination.

LA REVUE DES BEAUX-ARTS



Le professeur Lippmann, l'inventeur de la photographie en couleurs, dans son laboratoire.

GEORGE JULL, who had worked with Dennis Gabor at the Imperial College, London, introduced me to fly's eye lens theory and holography in 1966 and noted that most physicists were familiar with Lippmann's work, as was Gabor. G. Jull assisted me by putting me in touch with Robert Pole and Roger de Montebello, both important integral photography researchers.

LIPPMANN, by 1911, has made an apparatus, a frame with 12 lenses, and is attempting to get beyond pseudoscopic imagery which H. E. Ives calls the "bette noire" of integral photography.

I think the pen in the ink well in the photo, absent in the illustration, shows that it was used by Lippmann to make notes in his workbook lying on the table top. The photo session may have opened up new lines of thought on his own preoccupation with the photographic process. In the illustration the detailing of the supports for the shelves behind his head is so much clearer than in the photo, therefore one must consider that there are other photos in the series probably earlier in the day with better light and shorter exposures. In the left foreground there is a stack of boxes and maybe a book, but the wooden box I think is a container of glass plates for photography, the box holding exposed plates in storage or ones unexposed and ready to be used. Real curiosity makes me wonder where the evidence of stereo photography might be. And did he make stereo photographs in full colour with his own process, on his way to integral photography, did he combine full colour photos using his interference of light process with stereo photography or any exposures later from multiple lensed apparatus? The chair on the right of the photo, was that a favourite chair? Did it go to the new laboratoire with white tiles and the Vermeer floor? Was he seated on it in the next photo session? The photo with him in pence-nez fourteen years later gazing out the window just like any day-dreamer.

The artist's book *Research and Reverie* has been produced in connection with an exhibition at Presentation House Gallery entitled *The Composite Image: New Work by Jerry Pethick* (February 2 to March 13, 1994). We would like to thank Jerry Pethick for his commitment to the project, for his flexibility and his insights. The artist wishes to make the following acknowledgements: Lloyd Cross and George Jull for hours of discussion; Margaret Pethick for support and assistance; Jennifer Ladd, for deciphering words; Karen Love for lucid and precise editing; and Lyle Chambers for his assistance. He would also like to mention his special collaboration with Patrick Ready on the work *Drawn on the Eye*.

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Le professeur Lippmann, illustration, courtesy Bibliothèque Nationale, Paris.

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