

(English Translation by French Author!!!)

THE SMALL NIEPCE'S CAMERA

1825

**Small camera in walnut wood equipped with an achromatic doublet
signed Vincent Chevalier, focal length 46 mm (1.81 inch), F/1.6**

Picture size : 46mm x 39mm (1.8 x 1.5 inch)

Overall dimensions: 105 mm x 71mm x 77 mm (4.1 x 2.7 x 3 inches)

In 2004 a friend collector contacted us to examine an item of which he thought to be a photographic camera which presented certain features.

At first glance, at the photographs which he had sent us, we thought it was a «camera obscura» well manufactured, beginning of the 19th century. A cubic case, lens encircled by a wooden ring and a lid on the top of the case.

When we checked the box personally, we changed our opinion and got lot of questions.



The history begins when our collector bought this "box" in 1982.

He didn't have any particular knowledge of cameras, neither in those days nor even today, his main field is «Technical Antiques» unexcelled. He has special gift and patience to "find" interesting and rare items in very numerous fields.

He, therefore, stored this camera for 22 years among numerous objects of his collections.

To one of his friends who had knowledge of early cameras he showed his collections one day. He was curious enough to disassemble the objective to see its formula. On one of the two lenses, he discovered a signature «V. Chevalier». It was the beginning of a research in identifying this camera and the reason why we have been asked for assistance.

Stage 1

The first elements

From the beginning, we had two indications, the first, an essential one: the signature of the lens and the other one, much more subject to question: a very small signature on the right side of the box, drawn in the wood, practically invisible without a good magnifier, which is « N. Niepce ».

It is proved that this camera has been bought for a minimal price, in a Sunday's bric-à-brac, in 1982, in Chatenoy le Royal, a small city of Burgundy, in France, in the middle of vineyards, 4 km of Chalon sur Saône – and this is important - only 11,2 km from the house of Nicéphore Niépce, called « La Maison du Gras» in Saint Loup de Varennes.

A little more careful analysis of this camera revealed that inside the case a mobile structure is holding a ground glass, moved by a brass screw from outside. The objective was constituted of two "not glued" lenses, one biconvex and the other plane concave. This last mentioned lens is signed V. Chevalier on its perimeter.

With these details we decided to subject this photographic camera –as obviously it is one– to our different experts for examination. At first, it caused a skeptical approach, for some of them a total doubt and for the others a much more positive opinion.

It is useless to say that none of our experts would have dared to assert whatever it is. At the very most, at best, we got a reaction « why not? ».

Because of this lack of certitude, we opened our research field to other experts or specialists worldwide involving the community of collectors to let us know their opinions and comments.

From this moment, we gathered an important quantity of facts, allowing us to orientate our researches in various and much more defined fields such as:

- 1) The optics: Undoubtedly, the essential point increasing our inquiry and our firm belief.
- 2) The physical analysis of the components of the camera, wood, techniques of assemblage, nails, patina etc.
- 3) Bibliography: Niépce wrote a lot. Is there any trace in the correspondence with his brother, or his cousin, his masters, his suppliers etc?

The Optics

The objective is an achromatic doublet of 46 mm focal length (its focal length called "optician focal length" which is the distance between the back lens and the sensitive plate is 36 mm) constituted of a biconvex frontal lens linked to a plan-concave back lens, not glued.



This back lens was signed by the optician with a graphite pencil on its perimeter.



The signature "V. Chevalier" was easily authenticated, it corresponds completely to the one appended on a patent signed by Vincent Chevalier, at the patent application for the "prism meniscus" on June 10, 1823 as well as on letters kept in archives of the Academy of Sciences.

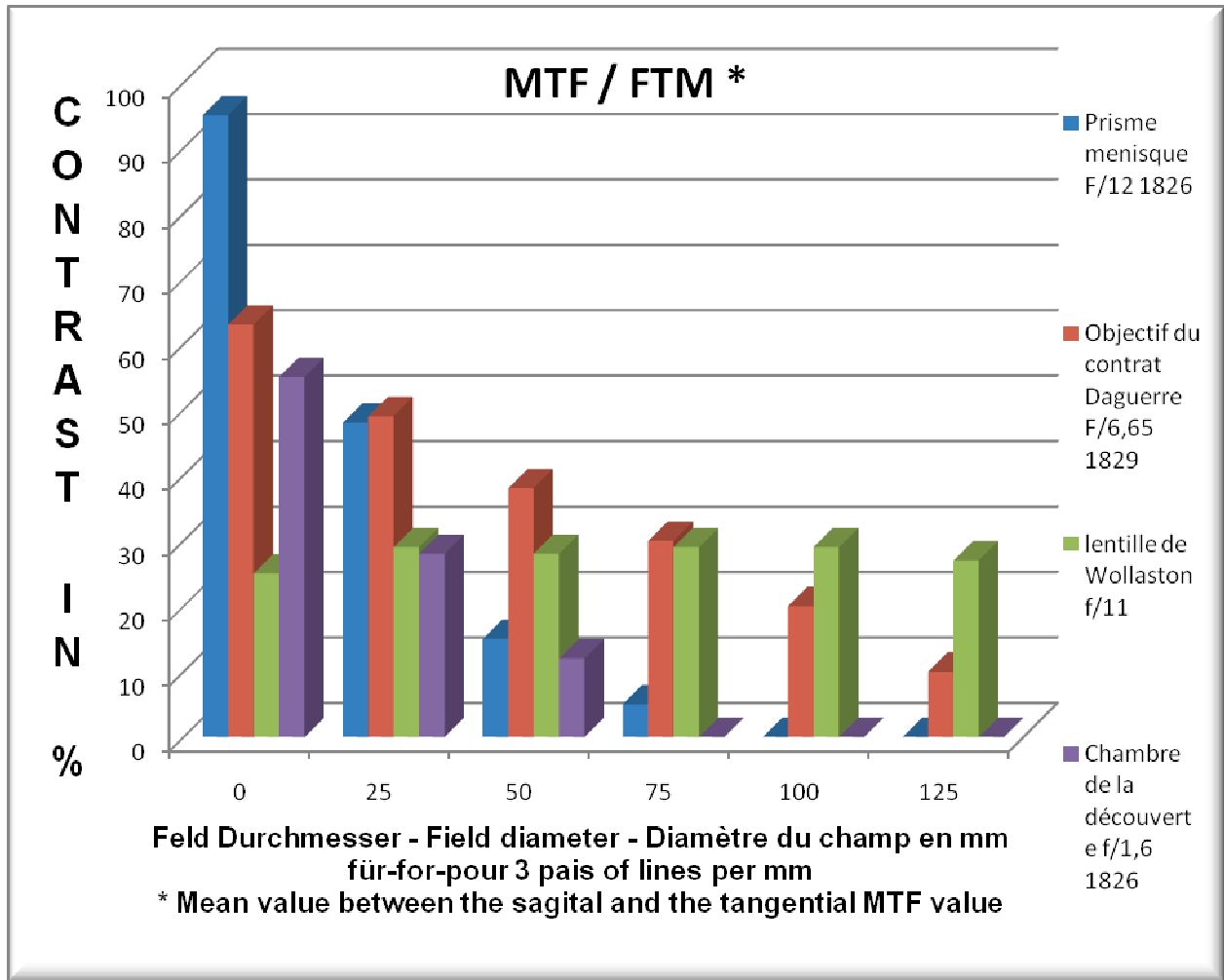
Jacques Louis Vincent Chevalier (called Vincent Chevalier) worked on the achromatism before 1819. He provided, the Société d'Encouragement pour l'Industrie with series of experimental results on several sorts of glass at that time. He also made in 1822 some comments to a member of the same société upon the manufacture of flint glass. He was the son of the optician Louis-Vincent Chevalier, and his son Charles and grandson Arthur maintained during half a century the prestigious know-how of the house.

In 1823 Vincent and his son Charles commercialize, for example, an achromatic lens for the microscope. Vincent died in 1841. Therefore the objective is dated before 1841. We shall see later that it is much more before 1841 ...

The research on the characterization of the optics was performed with the extremely precious help by Jacques Roquencourt, Vigny, France, who offered straightaway to make on his computer a simulation of the lens with precise dimensions as well as the so called Optician's focal length (the distance from the back lens to the ground glass, focused to the infinity).

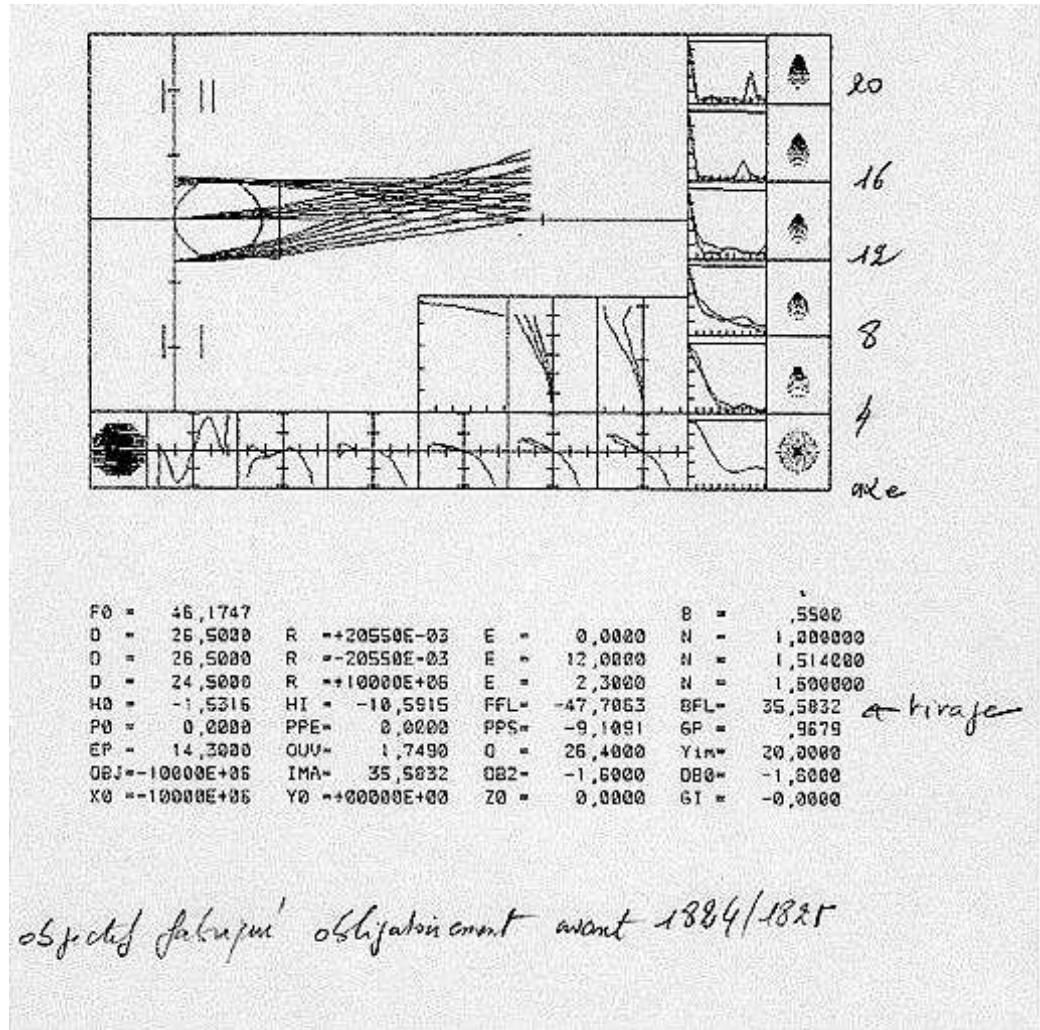
During previous researches, Jacques Roquencourt had analyzed, reproduced and made necessary measurements of two objectives also used by Niépce. (see Appendix 1) It was, in this case, the simple biconvex or even plan-convex lens, which performances were very weak and the aperture located between F/11 or F/12 and –much more important– the objective of Daguerre «objective of the contract» dated therefore 1829, which meant a significant improvement of performances (it was three times brighter with a much larger field coverage).

It therefore was easy for him to compare results acquired with the three types of lenses as well on the parameters of spherical, coma, chromatic aberration as on the curves of Frequency Transfer Modulation which are remarkably eloquent.

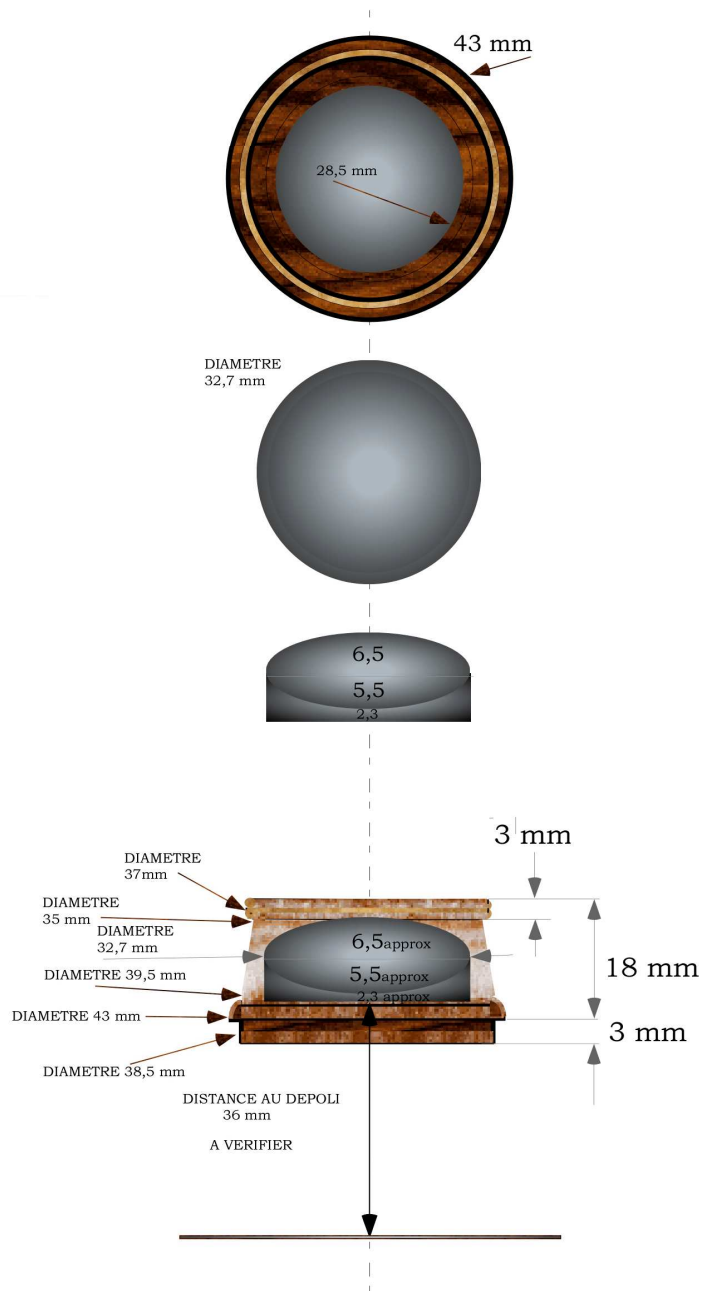


We noted that the objective of the small camera which we called now «the so-called Niépce's camera» presented a contrast and a coverage comparable with the simple periscopic Wollaston lens but less performing than the "objective of the proportionally contract" by Daguerre, dated 1829.

The curves below show the performances calculated on the 46 mm focal length objective of Vincent Chevalier.



Brilliant demonstration which dates our objective between May 5th, 1816 and 1829. We know that in 1816 Niépce made some tests with a simple optic and that he broke his lens (see his letter to his brother Claude, mentioned in the excellent book of Jean-Louis Marignier « *Niépce, l'invention de la photographie* » by Belin, and also pages 19 and following in the collection of the letters of Niépce "1816 - 1817" edited by the Association of the « *Pavillon de la Photographie* » printed for the *Parc Naturel Régional de Brotonne*). In 1829 or later, it would have been senseless to manufacture a camera with such an objective when Daguerre had already proved the excellence of his objective.



The body of the objective is absolutely similar to that of a « camera obscura » from the beginning of 19th century (see to the Camera Obscura of Daguerre in the *Conservatoire National des Arts et Métiers* in Paris which dates from 1818 and that has an identical objective mount), a ring of turned wood, simply adjusted on the front of the camera. No trace of glue.

The box

A nearly cubic wooden box of walnut wood on which we still find traces of a file, the marks of a vice, some traces of possible cutting lines etc. Apparently the work of a cabinetmaker for a study without any aesthetic worry. Nevertheless well manufactured, the sides are nailed. We note that the nails used in this assembly are irregular and seem to be handmade, which would date the assembly at the beginning of the 19th century.

The upper lid allows inserting a chassis holding a ground glass (the dimensions of the ground glass are 46 mm x 39 mm) or the sensitive plate on a mobile tray operated by a brass screw. This lid is held by two laterally hinges in brass, absolutely efficient though extremely simple. The back panel is removable and slides on a dovetail; it is pierced in its centre by a 23 mm hole through which one can check the focus on the ground glass.

A very detailed analysis of the cabinet making was made by a French expert who has been in charge of the restoration of the daguerrian Camera of Giroux from the *Musée du Conservatoire National des Arts et Métiers* à Paris. This expert, Mr. Michel Jamet, Professor in the *Institut National du Patrimoine*, therefore disassembled "virtually", of course, and reassembled this camera in front of us and has been able to reconstruct all the steps of manufacturing.

The walnut wood constituting the sides of the box (4 mm thick and 80,5 mm length) comes from the same initial wooden plank. The traces of cutting lines give the precise position of the front panel after its insertion into the box.

The front panel is 9 mm thick. It is also made of walnut wood but comes from another wooden plank. Thanks to its embedding, it is absolutely lightproof. The drilling where the objective is fitted is exactly in the centre of the board. We still see bisectors as well as the positioning of the pins of the compass having served for drawing these bisectors. This drilling was a bit too small; we see the traces of gouge for adjusting the diameter of the hole to that of the objective for a close fit without glue.



The part of the camera located between the objective and the sliding plate carrier is tinted in black, as signaled very early by Niépce in his letters.

On the sides and on the bottom side of the camera we find several dented traces in "V" shape. The camera was tightened in the vice to make the dovetails on the back. This back plate is removable by sliding in the dovetail and includes a screw to move the internal plate carrier for focusing on the ground glass. It is pierced with a 23 mm hole in its centre.

In fact walnut wood does not allow its dating by dendrometry as it is possible with oak wood. The dating is not a proof if the object was manufactured at a certain date but would allow to prove a fake in case the wood would be younger than the date estimated for the object. On the contrary, we learned that a dating can be performed by DNA research. In this case, the specialists are absolutely convinced that a fake is impossible; this patina cannot be "reproduced".

Everything would have been simple without the existence of a not very distinctly detectable identification...even under binocular magnifier (total length 15 mm!!) on the right side and above the objective (when we hold the camera to take a picture)



These letters are probably drawn with a dry point and we can read N. Niepce in the form of capital "N" (finely wrought and identical to that of the signature appended on the contract which N. Niépce signed with J.L.M. Daguerre in 1829), then a dot, then one « big "n" » followed by the four other letters "iepce" in lower case, those are also similar to the handwritten signature of Nicéphore. The accent on the "e" is hardly detectable between the grain of the wood and the various streaks.

It is obvious that this identification, we don't call it signature, could have been inscribed at any time. Its existence was a major reason of doubts expressed at the beginning of the presentation of the camera to various experts who helped us all over the world. They ignored, that this kind of identification was common in this epoch for the cabinetmakers, clockmakers and other craftsmen.

Stage 2

Cross-checks, reverifications and validation of hypothesis

Provided with all these elements, we tried to re-validate them by further sources to acquire other solid results.

Eighteen months of research later – the camera since then found a new owner – we got several reasons leading us to be sure that this camera is «a camera ordered or used by Nicéphore Niépce».

- 1) We re-calculated all parameters of the objective of this small camera and compared them with those of the camera used by Niépce to take the first picture called «*Le Point de Vue du Gras*» kept in the Gernsheim collection of the Harry Ransom Research Center of the Texas University in Austin in the U.S.A. This camera is called «*Chambre de la Découverte*/Camera of Discovery» and it is kept in the Nicéphore Niépce Museum in Chalon-sur-Saône in France.

According to comparative studies made both on the original Heliography/Photography «*Le Point de Vue du Gras*», in Austin, and on the «*Chambre de la Découverte*» in Chalon-sur-Saône as well as on this small camera by Jacques Roquencourt, he discovered a peculiarly interesting similarity between this camera and the "*Chambre de la Découverte*".

The study made by Jacques Roquencourt on this subject shows Nicéphore used a 118 mm focal length objective with an aperture of $F / 1.5$ or $F/2$. (See Appendix 1)

The tests made with the same chemical technique, the simulation by calculation and experimental comparison made with an identical lens, allow affirming that the exposure time was not longer than one day.

The *Point de Vue du Gras* was taken from above due to a shift of the optical axle of 25 mm allowing to center at the subject: ***la Cour du Gras***.

In August 9th and November 2nd, 1826 Niépce pointed out to his cousin Alexandre du Bard de Curley that he is making tests on heliography and that he uses a short focus lens. His comments on his results comply with observations: this objective gives good results on a field of about 50 mm.

Considering the comment of November 2nd, 1826 and the modifications made at the «*Chambre de la Découverte*» to perform the *Point de Vue du Gras*, prove that this camera was designed and manufactured latest at the beginning of 1825.

This small camera is equipped with an objective constituted by two not glued lenses, 46 mm of focal length. The useful diameter of this objective is 28.5 mm giving a $F/1.6$ numerical aperture.

The careful examination of this camera proves that it was designed for this objective.

The results obtained with this small camera are, up to a point, identical to those provided by the large camera of Chalon-sur-Saône: exposure time and good resolution of the image in the central part, this one being acquired by the use of an objective (biconvex and plan-concave lenses) assuring a minimum of spherical aberration.

Only in March 1828 Vincent Chevalier delivered a 3-lenses objective to Niépce.

He also manufactured the same objective with the same lens formula, but cemented, around 1830 as indicated on page 23 in the book «100 anni di Obiettivi Fotografici dal 1830 al 1930 »by Ugo Menichini and Marco Paolo Pavese printed by Ferrari in Genova, in 1996.

- 2) It is also very intriguing that, in this small camera the focusing on the ground glass is checked through a hole of 23 mm in diameter, the 23 mm hole we also find on both sides of the "*Chambre de la Découverte*". Certain authors assume that these two holes allowed checking the focus on the sensitive surface, before shot.



- 3) A recurrent question was:

Why is there no note about this objective in the correspondence between V. Chevalier and N. Niépce?

Isidore, the son of Nicéphore, gets married at the beginning of 1825 to a young lady Barbe-Eugénie of ChampMartin. The new stepfather, Mr. Henry Gaucher de ChampMartin, gives opportunity to Nicéphore to meet his friend the Comte de Mandelot. It is the Comte who suggests to Nicéphore to begin a correspondence with Vincent Chevalier. In fact, June 1825 Nicéphore is only a simple customer of V. Chevalier. His correspondence with Vincent Chevalier will last until 1829, Daguerre will, of course, replace Chevalier.

Nevertheless, we know that the Comte de Mandelot lived in Paris, Rue des Saints-Pères, at about 1 km of the boutique of Vincent Chevalier, Quai de l'Horloge. This allowed, beginning of June 1825, Mr. Gaucher de ChampMartin to bring from Paris some plates of copper and one prism meniscus made by Vincent Chevalier to Nicéphore Niépce. It is very much probable that the objective followed the same way to Nicéphore.

- 4) The sagacity of numerous specialists who worked on this file allowed us by simple deduction and in front of a map of the region of Chalon-sur-Saône to discover "the" essential detail which, with all the other ones, allows us finally to call this small wooden camera «La Petite Chambre de Niépce» **(The small Niépce's camera)**.

After the death of Nicéphore, all equipment of its workshop, tools, cameras and plates etc was gathered and stored by Isidore his son and heir in a village of Saône and Loire called Lux

It was rediscovered in 1851 by Jules Chevrier, deputy mayor and president of the Society of History and Archaeology of Chalon-sur-Saône. The whole lot was brought back around 1861 to Chalon-sur-Saône and displayed much later in the Nicéphore Niépce Museum only in 1974.

The village of Lux is located 8 km from Chatenoy-le-Royal where this camera was bought in 1982 and 4 km from Chalon-sur-Saône where all equipment of Nicéphore Niépce was stored during 113 years. What happened during these 113 years, on which we can add 10 years (1851 - 1861) with Chevrier and 17 years between the decease of Nicéphore on July 5th and the discovery by Jules Chevrier in 1851? For 139 long years....

We, besides, have the proof that Isidore Niépce rewarded some of his friends with documents or engravings coming from this supply. He even gave a printing of the engraving called the «Cardinal d' Amboise» dedicated to Jules Chevrier «with its tender memory».

We also know that Jules Chevrier owned the historical original plate of the Cardinal d' Amboise made by Niépce as certified it his dedication on a printing given to the Direction du Conservatoire National des Arts et Métiers in Paris: «*First result "Héliographique" obtained in 1824 by J. Nicéphore Niépce. Engraving made with the original plate belonging to Mr. Jules Chevrier from Chalon sur Saône, given to the Direction du Conservatoire National des Arts et Métiers. Chalon s / Saône March 25th, 1881. Signed J. Chevrier.*».

Conclusion

A temporary indeed conclusion of this research is that we discovered another camera of Niépce, completely unknown by the authors having worked on the subject... and they were many.

This camera proves that Niépce followed a true development process, with several solutions, each time.

Was it a camera having been used for the development of the "Chambre de la Découverte"? Was it a sequel of the camera about which Niépce wrote in 1823 «a small 4 pouces camera» (10,8 cm) which made 4 pouces diameter pictures and which disappeared?

Gratitude

Our gratitude goes to all those who participated in our researches and collaborated, without any particular a priori, on the discovery of the identity of this object.

Thanks:

To the "Auction Team Köln" experts.

To Mr. Jacques Roquencourt, for his precious assistance both for its calculations and analysis and the provision of his encyclopedic knowledge and rare and/or unpublished documents.

To Miss Marie-Sophie Corcy, Engineer-Doctor at the Museum of the *Conservatoire National des Arts et Métiers*, in Paris for her kind assistance and to Mr. Michel Jamet, Professor in the *l'Institut National du Patrimoine*, for its very clear explanations due to his deep knowledge of the history of the cabinetmaking.

To all friends' collectors and/or experts, in the whole world, who were kind enough to provide us their cogitations, their questions, their certainties.

To all those who rejected the camera before having seen it, who encouraged us to search farther and, in fact, to have helped us to find proofs!

Bibliography

The excellent books on Niépce, written by Mr. Jean-Louis Marignier «Niépce, *the creation of the photography*» by Belin and, in collaboration with Mr. Manuel Bonnet, «*NIEPCE correspondence and papers*», two big volumes edited by la Maison de Niépce in 2003.

The collection of the «*Lettres de Niépce 1816 - 1817*», edited, in Rouen in 1973, by the Association of «*Pavillon de la Photographie*» of the *Parc Naturel Régional de Brotonne*.

The letter, dated November 2, 1826 between Niépce and Alexander Du Bard de Curley, his cousin. Correspondence acquired by *la Bibliothèque de France* on March 21st, 2002 during the auction of the collection of André Jammes. Many thanks to Madame Sylvie Aubenas for giving us the chance to study this mail from the acquisition.

In «*Ausführliches der Photographie, Band 1, 1. Teil, Geschichte der Photographie*» (History of the Photography) of the Adviser in the Court of Vienna and Doctor Josef Maria Eder, edited by Wilhelm Knapp in 1905.

The notes written by J. Roquencourt in «*Daguerre et l'Optique*» in «*Etudes Photographiques*» Nr 5, March 1998

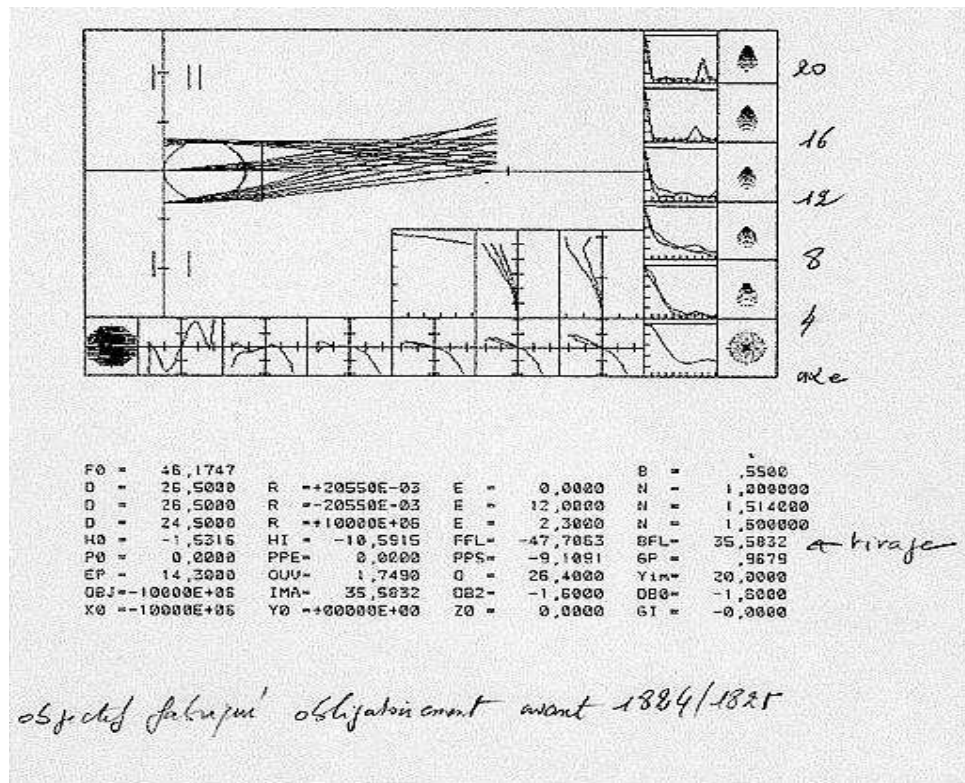
«*Etude sur la vie et les travaux scientifiques de Charles Chevalier Ingénieur-Opticien par Arthur Chevalier son fils*» «Study on life and scientific works of Charles Chevalier engineer-optician by Arthur Chevalier his son» edited in Paris in 1862.

«100 anni di Obiettivi Fotografici dal 1830 al 1930» by Ugo Menichini and Marco Paolo Pavese printed by Ferrari in Genova, in 1996

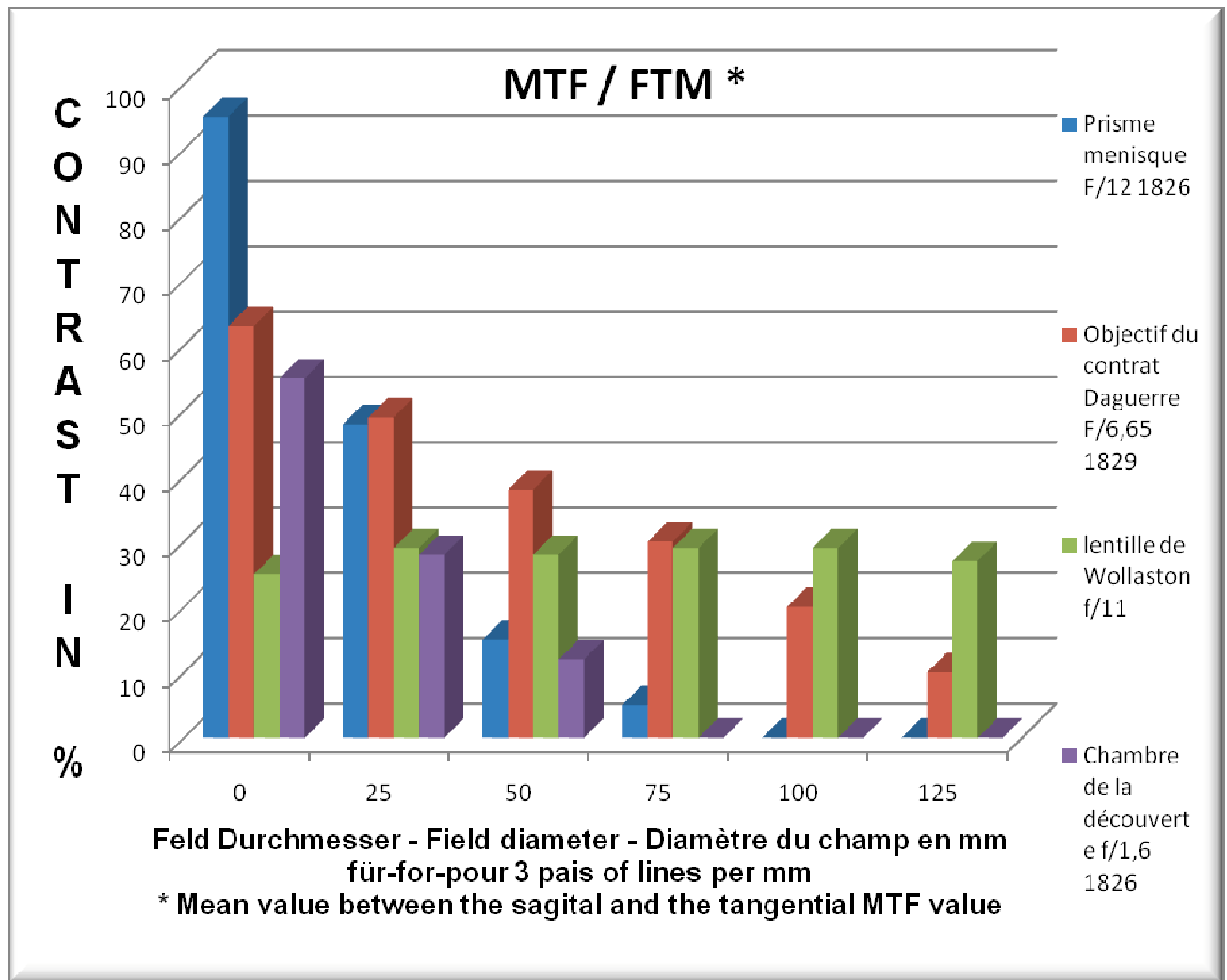
Quantities of works and documents both edited by the Museum Nicéphore Niépce in Chalon-sur-Saône and by *the Harry Ransom Humanities Research Center at the University of Texas at Austin*.

APPENDIX 1

The optics used by Niépce throughout his tests, from 1816 to that used on the Chambre de la Découverte in Chalon-sur-Saône into 1826, were simple lenses either biconvex or even plan-convex. They had a good resolution in the center of the image but did not have a significant field coverage. The characteristics of the achromatic objective of the small Niépce's camera, all things considered, are identical to the objective of the Chambre de la Découverte of 118 mm focal length which was used at F/1,5 or F/2, practically at full opening, and which shows a weak or non-existent field coverage. See below the calculations made by J. Roquencourt on the objective of V. Chevalier already mentioned above.



We made a “complete panorama” of the performances on Modulation Transfer Function (MTF) of the objectives accessible by Niépce between 1816 and 1829. That way, the comparison allows to place the optics of Vincent Chevalier (identical in performances to that of Chalon sur Saône) compared to the others.



Looking at the curves of the Modulation Transfer Function resulting from these calculations we are seeing:

- An excellent result in the center of the image for the prism meniscus but a collapse on the sides, although it is closed in F/12. (blue bars)
- A good contrast on the major part of the image produced by the objective of Daguerre closed at F/6,65 dated 1829. (red bars).
- A weak average contrast between 20 and 30%, but on the whole field, for the lens of Wollaston closed in F/11 (green bars),
- A very good contrast (52%) in the center of the image for the objective of the Chambre de la Découverte (which was not achromatic) closed between F/1,6 and F/2 but, of course, a major lack of field coverage such as one can note it on “le Point de Vue du Gras”, the first photography dated 1827 which is today in the Harry Ransom Humanities Research Center at the University of Texas in Austin USA (purple bars).

The tests were carried out, for non-achromatic objectives, at the maximum sensitivity at 0,56 micron.

It should be reminded that the objectives of the Chambre de la Découverte as well as that of the Small Niépce's Camera are what Niépce himself calls "Short Focus". He complains in a letter to his cousin de Curley dated November 2, 1826 in which he writes, in short, that he obtained a better resolution of the image but that the image "is too tight" because of the short focal length, problem to which he must find a solution.

He repeats this remark in his letter dated February 18, 1830 to Vincent Chevalier where he writes: "It is good to know that Mr. Daguerre, a very skilful optician, invented an improved optic whose brightness is in the ratio from 3 to 1". He adds that he finds that the short focus glasses are missing definition. In his answer, V. Chevalier points out to him, very politely, that it is not a question of intrinsic quality, that these objectives are good but that the image is tightened and is too small to see the real quality.

The visual examination, years after the shot, of the Point de Vue du Gras by Robert Hunt at Francis Bauer, and his faithful description, show that this heliography was not made using the parameters mentioned in the contract between Niépce and Daguerre. It is certain, and that was reproduced, in an extensive way, by Jacques Roquencourt, that the formulas of the photochemical composition as well as the optics differed appreciably.

(c.f. Note n°3 page 40 in the article of J. Roquencourt "Daguerre and Optics" in "Photographic Studies" N°5, in March 1998) in which he is writing that the base of the contract with Daguerre was the polymerization of the Bitumen of Judea and that the sensitivity of the compound of Bitumen of Judaea / Oil of lavender is highly dependent on the bitumen concentration in the oil of lavender.

For his shot, historically essential, of the Point de Vue du Gras, Niépce simply "optimized" the photochemical combination and the large opening of his short focus objective with its limited performances.

Pierre-Jean Bickart, September 2007