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**PICTURING THE COSMOS: SURREALISM, ASTRONOMY,
ASTROLOGY, AND THE TAROT, 1920S-1940S**

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ASTROLOGY, AND THE TAROT, 1920S-1940S**

by

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Dedication

To JWB

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This dissertation explores the presence and meaning of astronomical elements in the creative work of Surrealist artists and writers who were involved with the movement from the 1920s to the 1940s. Set against a backdrop of widespread popular interest in astronomy in France during these decades and those directly preceding them, Surrealists such as André Breton, Joan Miró, Max Ernst, Wolfgang Paalen, Oscar Domínguez, Matta, Remedios Varo, Leonora Carrington, and Kurt Seligmann all addressed cosmic themes in their artistic production. This dissertation identifies and analyzes their varied engagement with such themes, including their presence in the related areas of astrology and the Tarot. The heavens offered the Surrealists a rich terrain for invention—one that could be seen as scientific or occult, fanciful or factual, as well as ancient or up-to-date. In their quest to access previously unknown realms of reality, the Surrealists found in the little-explored and often strange territory of outer space a new realm for creative invention. As such, these artists and writers projected their surreal visions onto the universe in their continued search for the marvelous.

Table of Contents

List of Illustrations	x
Introduction	1
METHODOLOGICAL APPROACH.....	4
STATE OF THE LITERATURE.....	7
OUTLINE OF THE DISSERTATION	12
Chapter 1 Astronomical Visions: The Popularization of Astronomy and Related Phenomena in the Late Nineteenth and Twentieth Centuries	16
ASTRONOMY: SCIENCE, IMAGINATION, OR BOTH?.....	17
PROMOTING THE COSMOS: ARAGO, FLAMMARION, AND FRENCH PERIODICALS AS ASTRONOMICAL POPULARIZERS	27
IMAGING THE COSMOS: ASTRONOMICAL PHOTOGRAPHY AND PLANETARIA AS POPULARIZERS	50
IMAGINING THE COSMOS: SCIENCE FICTION AS ASTRONOMICAL POPULARIZER	59
DIVINING THE COSMOS: THE FRENCH OCCULT REVIVAL, ASTRONOMY, AND THE TAROT AS ASTRONOMICAL POPULARIZER	71
Surrealism's Engagement with the Occult	71
The Late Nineteenth-Century French Occult Revival	78
The Popularization of Astrology in the Late Nineteenth and Twentieth Centuries	83
The Popularization of the Tarot in the Late Nineteenth and Twentieth Centuries	90
Chapter 2 Science in the Streets: Astronomical Encounters in Surrealist Paris	95
SURREALIST AND ASTRONOMICAL PARIS AS CREATIVE IMPETUS	98
ASTRONOMICAL POINTS OF ACCESS: THE PALAIS DE LA DÉCOUVERTE AND INTERACTIVE EXHIBITION TACTICS	110

Chapter 3 Cosmic Preoccupations: Joan Miró, Max Ernst, and Astronomy	133
MIRÓ AND ASTRONOMY	135
ERNST AND ASTRONOMY	157
Chapter 4 Outer Space/ Inner Space Surrealist Understandings of Interstellar Space	180
SURREALISM, EINSTEIN, AND THE SPACE-TIME CONTINUUM	182
ANDRÉ BRETON'S SURREALIST SOURCES ON EXTRATERRESTRIAL LIFE	191
SURREALIST VISIONS OF INTERSTELLAR SPACE AND TRAVEL	195
Chapter 5 Astral Magicians: Surrealism and Occult Astronomy	199
BRETON AND ASTROLOGY	200
BRETON AND THE TAROT: THE JEU DE MARSEILLES, <i>ARCANUM 17</i> , AND LE SURREALISME EN 1947	205
The Jeu de Marseilles	206
<i>Arcanum 17</i>	209
The 1947 Surrealist Exhibition and the Tarot	213
KURT SELIGMANN, SURREALIST SCHOLAR OF OCCULTISM: <i>THE MIRROR OF MAGIC</i> , ASTROLOGY, AND THE TAROT	217
SURREALIST ART, ASTROLOGY, AND THE TAROT: REMEDIOS VARO AND LEONORA CARRINGTON	221
Conclusion	237
Bibliography	243

LIST OF ILLUSTRATIONS

All images are withheld from publication for reasons of intellectual property rights.

- Figure 1: Cover of *La Révolution Surréaliste* 2 (June 15, 1926) with photograph by Eugène Atget (*Avant l'Eclipse. Place de la Bastille, 17 avril 1912*).
- Figure 2: Map of Mars by Giovanni Schiaparelli, 1877-1878. From Camille Flammarion, *La Planète Mars, et ses conditions d'habitabilité*, vol. 1 (Paris, 1892).
- Figure 3: Map of Mars by Nathaniel Green, 1877. From N. E. Green, "Observations of Mars, at Madeira in Aug. and Sept., 1877," *Memoirs of the Royal Astronomical Society* 44 (1877-79), fol. p. 138.
- Figure 4: Percival Lowell, photographs of Mars, 1905. Lowell Observatory Archives, Flagstaff, Arizona.
- Figure 5: Man Ray, *Observatory Time—The Lovers*, 1932-34, oil on canvas, Nyarkos Collection.
- Figure 6: Marcel Duchamp, Installation for the 1938 International Surrealist Exhibition, Paris: Main Grotto with "1200 Sacks of Coal."
- Figure 7: Joan Miró, *The Olive Grove*, 1919, oil on canvas, Collection of Mr. and Mrs. Leigh B. Block, Chicago.
- Figure 8: Joan Miró, *Carnival d'Arlequin*, 1924-1925, oil on canvas, Albright-Knox Gallery, Buffalo, N.Y.
- Figure 9: Joan Miró, *Chien aboyant à la lune*, 1926, oil on canvas, Philadelphia Museum of Art.
- Figure 10: Joan Miró, *L'Ermitage*, 1924, oil on canvas, Philadelphia Museum of Art.
- Figure 11: Miró's studio at Palma de Mallorca, 1958. Photograph by Daniel Frasnay.

- Figure 12: Joan Miró, *Le Lever du soleil*, 1940, gouache and oil wash on paper, Private Collection, United States.
- Figure 13: Joan Miró, *L'Échelle de l'évasion*, 1940, gouache and oil wash on paper, Museum of Modern Art, New York.
- Figure 14: Joan Miró, *Personnages dans la nuit guides par le traces phosphorescentes des escargots*, 1940, gouache and oil wash on paper, Philadelphia Museum of Art.
- Figure 15: Joan Miró, *Femmes sur le plage*, 1940, gouache and oil wash on paper, The Jacques and Natasha Gelman Collection.
- Figure 16: Joan Miró, *Femmes à la blonde ausseulle coiffant sa chevelure à la luer des étoiles*, 1940, gouache and oil wash on paper, The Cleveland Museum of Art.
- Figure 17: Joan Miró, *Le Passage de l'oiseau divin*, 1941, gouache and oil wash on paper, Private Collection, United States.
- Figure 18: Joan Miró, *La Chéveleure défaite à la fuite des constellations*, 1954, oil and tempera or gouache on machine-woven fabric printed to look like tapestry, Collection Joseph Holtzman.
- Figure 19: Joan Miró, *Le Disque rouge*, 1960, oil on canvas, New Orleans Museum of Art.
- Figure 20: Joan Miró, *Autoportrait I*, 1938, pencil, crayon, and oil on canvas, The Museum of Modern Art, New York.
- Figure 21: Max Ernst, *Untitled*, 1920, gouache, ink, and pencil on printed reproduction mounted on paperboard, Private Collection, Paris.
- Figure 22: Max Ernst, *Sodaliten Schneeberger Drückthäler*, 1920, pencil, India ink, gouache, and paint on printed reproduction mounted on paperboard, Private Collection.

- Figure 23: Max Ernst, *Katharina Ondulata*, 1920, gouache and pencil on wallpaper mounted on paperboard, Moderna Museet, Stockholm.
- Figure 24: Max Ernst, *The Cormorants*, 1920, collage of cut printed reproductions, gouache, ink, and pencil on photographic reproduction, Private Collection.
- Figure 25: Max Ernst, *Santa Conversazione*, 1921, photograph of a collage, Private Collection.
- Figure 26: Max Ernst, *My Little Mont Blanc*, illustration for *Les Malheurs des immortels* by Paul Eluard, 1922, etching on cream laid paper, Fine Arts Museums of San Francisco.
- Figure 27: Max Ernst, *La Mer et la pluie* from *Histoire naturelle*, 1926, collotype after a frottage, Museum of Modern Art, New York.
- Figure 28: Max Ernst, *Un Coup d'oeil* from *Histoire naturelle*, 1926, collotype after a frottage, Museum of Modern Art, New York.
- Figure 29: Max Ernst, *Petites Tables autour de la terre* from *Histoire naturelle*, 1926, collotype after a frottage, Museum of Modern Art, New York.
- Figure 30: Max Ernst, *La Mer*, 1925, oil on canvas, Los Angeles County Museum of Art.
- Figure 31: Max Ernst, *Au Rendez-vous des amis*, 1922, oil on canvas, Museum Ludwig, Cologne.
- Figure 32: Max Ernst, *La Forêt*, 1926, oil on canvas, Private Collection, New York.
- Figure 33: Max Ernst, *La grande forêt*, 1927, oil on canvas, Kunstmuseum Basel.
- Figure 34: Max Ernst, *Capricorne*, 1948, bronze, The Menil Collection, Houston.
- Figure 35: Max Ernst, *Colline inspirée*, 1950, oil on canvas, The Menil Collection, Houston.

- Figure 36: Max Ernst, *Untitled* folio five (right page of a double folio) from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 37: Max Ernst, *Untitled* folio 15 (left page of a double folio) from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 38: Max Ernst, *Untitled* folio 15 (right page of a double folio) from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 39: Max Ernst, *Untitled* folio 17 from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 40: Max Ernst, *Untitled* folio 7 (left page of a double folio) from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 41: First photograph of the Orion Nebula by Henry Draper, 1880.
- Figure 42: Max Ernst, *Untitled* folio 10 (left page of a double folio) from *Maximiliana*, 1964, etching on ancient Japan paper, Fine Arts Museums of San Francisco.
- Figure 43: Max Ernst, *Le monde des naïfs*, 1964, oil on canvas, Musée National d'Art Moderne, Centre Pompidou, Paris.
- Figure 44: Max Ernst, *Bewildered Planet*, 1942, oil on canvas, Tel Aviv Museum.
- Figure 45: Max Ernst, *Head of a Man Intrigued by the Flight of a Non-Euclidean Fly*, 1942-1947, oil on canvas, Private Collection, Zurich.
- Figure 46: Remedios Varo, *Fenómeno de ingravidez*, 1963, oil on canvas, Private Collection, Mexico.

- Figure 47: Remedios Varo, *Tejido espacio-tiempo*, 1954, oil on Masonite, Private Collection, Mexico.
- Figure 48: Wolfgang Paalen, *Space Unbound*, 1941, oil on canvas, Private Collection.
- Figure 49: Oscar Domínguez, *Nostalgia of Space*, 1939, oil on canvas, Museum of Modern Art, New York.
- Figure 50: Man Ray, *Objet mathématique* (mathematical models from the Institut Poincaré, Paris), 1934, gelatin silver photograph, Musée d'Art Moderne, Centre Pompidou, Paris.
- Figure 51: Matta, *Psychological Morphology No. 104*, 1939, oil on canvas, Private Collection.
- Figure 52: Matta, *Vertigo of Eros*, 1944, oil on canvas, Museum of Modern Art, New York.
- Figure 53: Matta, *Space Travel*, 1938, crayon and pencil on paper, San Francisco Museum of Modern Art.
- Figure 54: Wolfgang Paalen, *The Space-ship*, 1937, oil on canvas, Private Collection.
- Figure 55: Oscar Domínguez, *Les Soucoupes volantes*, 1939, oil on canvas, Private Collection.
- Figure 56: Oscar Domínguez, *Paysage cosmique*, 1939, oil on canvas, Collection Guillermo de Osma, Madrid.
- Figure 57: Oscar Domínguez, *Mars*, 1954, decalomania and gouache, Private Collection.
- Figure 58: The Jeu de Marseilles: The Suit of Stars, 1940.
- Figure 59: The Star (Arcanum 17), The Tarot of Marseilles.

- Figure 60: The Star (Arcanum 17), Oswald Wirth Tarot.
- Figure 61: Magic Evening (Soirée Seligmann) on May 8, 1948 in Kurt Seligmann's studio, Seligmann Estate Basel.
- Figure 62: Remedios Varo, *La Llamada*, 1961, oil on masonite, Private Collection, Mexico.
- Figure 63: Remedios Varo, *Retrato de doctor Ignacio Chávez*, 1957, oil on masonite, Private Collection, Mexico.
- Figure 64: Remedios Varo, *Creación con rayos astrales*, 1955, tempera on masonite, Private Collection.
- Figure 65: Remedios Varo, *Premonición*, 1953, gouache on paper, Private Collection, Mexico.
- Figure 66: Leonora Carrington, *Le Grand Adieu*, 1958, oil on canvas, Private Collection.
- Figure 67: Leonora Carrington, *The Garden of Paracelsus*, 1957, oil on canvas, Private Collection.
- Figure 68: Remedios Varo, *La Huida*, 1961, oil on masonite, Museo de Arte Moderno, Ciudad de Mexico
- Figure 69: Remedios Varo, *El Juglar*, 1956, oil and inlaid mother-of-pearl on masonite, Private Collection.
- Figure 70: Leonora Carrington, *Portrait of Max Ernst*, 1939, oil on canvas, Collection of Juan Carlos Correa.
- Figure 71: Max Ernst, *Naissance d'une galaxie*, 1969, oil on canvas, Galerie Beyeler, Basel, Switzerland.

Introduction

On the cover of the summer 1926 issue of *La Révolution Surréaliste*, a photograph [Fig. 1] showing a group of Parisians, eyes shielded but gazing up at the heavens, was anonymously published with the simple caption “Les dernières conversions” or “the last conversions.”¹ The caption suggests a moment of change, perhaps the indoctrination of the gathered crowd into the Surrealist cause. The coming Surrealist revolution of the journal’s title, it seems, was indelibly linked to some cosmic event or change.

Originally captured by Parisian photographer Eugène Atget in 1912, the image was first titled *Avant l’Eclipse. Place de la Bastille, 17 avril 1912* [Before the eclipse, Place de la Bastille, 17 April 1912]. Atget shows us a rapt audience of men, women, and children who had gathered on the streets of Paris with the hopes of viewing a rare event, a total solar eclipse. A closer look reveals that many of those gathered hold small tinted shields or viewing glasses over their eyes. The French public would have learned about such an astronomical event in the popular press. The opportunity to view a total eclipse was unusual, and with optimal viewing conditions in areas of France and Spain, the Parisian press heartily encouraged citizens to view the event, with an occultation just before noon in the city.² Atget’s image, with the added information of the title, invites

¹ *La Revolution Surréaliste*, 2 (June 15, 1926).

² The eclipse was covered by the popular press in the days leading up to and just after the event. Articles not only directed readers on the best times and ways to view the eclipse but also provided brief explanations of the event’s scientific significance. The event was headline worthy news, only superseded

the viewer to take in the awe and wonder of the crowd who were party to such a startling and impressive astronomical phenomenon. French science and astronomy popularizer Camille Flammarion perhaps best describes the childlike wonder viewers may have felt upon viewing such an event; he playfully describes a solar eclipse as the result of the sun and moon “playing at hide-and-seek.”³ As Atget’s image attests, astronomical events like the 1912 eclipse were major popular occurrences. The heavens and their observation were not solely the domain of scientists and instead were enjoyed and seen by a whole range of popular viewers.

Despite publishing the image anonymously, the Surrealists knew both its author and the event captured; Atget himself requested that his name not be used in the Surrealist reprinting of the image.⁴ Surrealist artist and photographer Man Ray’s new studio assistant, Berenice Abbott, had introduced the Surrealists to Atget’s work earlier in 1926.⁵ And, the Surrealists were quite taken by the photographer’s everyday images of the streets of Paris. Most of the images by Atget that the Surrealists republished are noted for their often haunting lack of a human presence—shop windows populated by the weird and absurd and desolate early morning views of the Paris environs. So, the

by articles on the sinking of the Titanic, just two days before. For examples of coverage in the popular press see: “L’Éclipse de Soleil d’Aujourd’hui,” *Le Petit Journal*, April 17, 1912; “Les eclipses et la physique solaire,” *La Croix*, April 17, 1912; “Ce qu’hier nos yeux ont vu: L’Éclipse de Soleil a été observée dans la France entière,” *Le Petit Journal*, April 18, 1912.

³ Camille Flammarion, *Astronomy* (Garden City, NY: Doubleday, Page & Co., 1914), 82.

⁴ Ian Walker, *City Gorged with Dreams: Surrealism and Documentary Photography in Interwar Paris* (New York: Manchester University Press, 2002), 88.

⁵ Keith Aspley, *Historical Dictionary of Surrealism* (Lanham, MD: Scarecrow Press, Inc., 2010), 49.

decision to include the eclipse image is intriguing. Some scholars have linked the image and its caption referencing “conversion” to a pointed jab at Catholicism and Surrealism’s disdain for organized religion or have read the image as depicting a type of public hysteria.⁶ But what of the inclusion of an image of an astronomical event? Was there perhaps a greater significance for the Surrealists?

A survey of surrealist imagery reveals innumerable responses to astronomical phenomena. While some artists chose to depict overt references to astronomy—images of stars, planets and other celestial bodies—within their compositions, others included more veiled or complex representations of astronomical phenomena such as Einstein’s theories on space-time, alien life forms and space travel, or the occult practices of astrology and the tarot. Surrealist authors and artists such as André Breton, Max Ernst, Joan Miró, Matta, Oscar Domínguez, Wolfgang Paalen, Kurt Seligmann, Remedios Varo, and Leonora Carrington mined the rich terrain of the universe for their creative work. While some of these artists certainly demonstrate an understanding of the latest findings in the field, others saw the heavens as an area for fantastic invention and imagination. And, this same mixing of science and fantasy was not out of place within the field of astronomy.

This dissertation explores the Surrealist engagement with astronomical phenomena as part of a larger cultural era in Paris—beginning in the later nineteenth century until the years just after World War II—when astronomy experienced widespread

⁶ Walker, *City Gorged with Dreams*, 90.

popular attention, particularly as new technology made the universe visually accessible in greater and greater detail. As a result, both the Surrealists and the public at large were caught up in a cultural impulse to know more about outer space and their own place in the larger universe. Grounded in both the history of astronomy in France and a formal and iconographical understanding of these works, the dissertation explores the significance of a range of astronomical elements and themes in Surrealist painting.

METHODOLOGICAL APPROACH

From the outset, the Surrealist movement was envisioned by its participants as an exploration of the unconscious mind. And yet, as a group, their artistic and literary production cannot be explained solely by their links to contemporary work on psychoanalysis and other trends in psychology. In the group's first manifesto, published by Breton in 1924, the newly formed movement pays homage to Freud as a forefather but sets forth on a course of more imaginative exploration. As Breton notes, Freud is merely a jumping off point, a means by which "a human explorer," or the Surrealists, "will be able to carry [Freud's] investigations much further."⁷ For Breton, and by extension the Surrealist faithful, Freud's ideas on the unconscious served to highlight the importance of the imagination in creative discourse more generally.

Surrealism was a movement defined by individuals, all of whom were loosely united by their interest in the human mind. But, how each artist chose to define, to

⁷ André Breton, *Manifestoes of Surrealism*, trans. Richard Seaver and Helen R. Lane (Ann Arbor: The University of Michigan Press, 1998), 10.

understand, and to envision the mind varied greatly. Not surprisingly, the Surrealists were engaged with a variety of issues in contemporary culture. Following the lead of Gavin Parkinson (discussed in the next section), who established the centrality of contemporary science for Surrealism, this dissertation explores the importance of astronomy for the movement. Astronomy is far from a sole key to Surrealism but, given the variety of visual and literary responses to astronomical phenomena, this realm offers important new insights into the movement.

The Surrealist group was a highly diverse and at times loosely organized conglomerate of individuals. A large number of artists are often associated with the movement, based variously on their actual engagement with key leaders in the group or on stylistic and formal similarities. The present study focuses on those individuals who worked in Paris and were in contact with Breton prior to World War II. As such, satellite groups, such as the circle of scholars and artists working alongside Georges Bataille, are not a primary concern here.

Moreover, artists who did not join the movement until the post-war period or artists working outside Paris in the pre-war years are also omitted. The artists who are included all showed their work in major Surrealist exhibitions and were a part of Breton's circle of Surrealist compatriots. However, the dissertation examines the work of these artists both from the pre-World War II years and beyond, when appropriate.

The inclusion of the Tarot as a form of occult astronomy also deserves some explanation. While there is a clear link between astrology and astronomy, the

relationship between the Tarot and astronomy is seemingly more tenuous. However, key cards from the deck's major arcana draw from astronomical imagery—the Star (XVII), the Moon (XVIII), and the Sun (XIX). Many traditional occult interpretations of the deck see this sequence of astronomical bodies, near the end of the twenty-two card progression of the major arcana, as symbolic of an ascent to the heavens or the completion of a greater cosmic journey toward wisdom and understanding. Moreover, while not all interpretations of the deck stress such a relation, occultists Éliphas Lévi and Papus, who helped shape Breton's understanding of the Tarot (and by extension that of the Surrealists), stressed a system of symbolic correspondences between the major arcana and astrological symbolism related to the planets and star signs. As such, some Surrealist work that reveals an engagement with the Tarot is relevant to the larger discussion of astronomical themes and imagery.

Comprehension of any work of art is incomplete without an acknowledgement of the contemporary ideas and institutions that helped shape both the artist and the culture in which it was produced. By recovering a historical moment when astronomy saw widespread popular interest as well as making careful formal, iconographical, and textual analyses, this dissertation illuminates the Surrealist engagement with themes grounded in astronomy and related fields such as astrology and the Tarot. My goal is to illuminate the astronomy-related art of Surrealism and thus enlarge the discourse on the movement, emphasizing its link to both science and related aspects of occultism.

STATE OF THE LITERATURE

A few sources have engaged the subject of modern art and astronomy. Among these, *Cosmos: From Romanticism to the Avant-garde* (1999), edited by Jean Clair and produced in conjunction with an exhibition at the Montreal Museum of Fine Arts, is perhaps the most comprehensive in its coverage of the modern era and the variety of artists and movements represented.⁸ *The Universe: A Convergence of Art, Music and Science*, which accompanied a multi-site celebration of the intersections of culture and astronomy at eight Southern California museum and cultural institutions in 2001, represents a similar effort; but, in terms of visual art, the text focuses on the work of post-war American artists.⁹

More specifically on the subject of Surrealism, Gavin Parkinson's *Surrealism, Art, and Modern Science: Relativity, Quantum Mechanics, Epistemology* (2008) is highly relevant to this project.¹⁰ Parkinson examines the Surrealist engagement with developments in the realm of physics and specifically quantum physics and Einstein's Relativity Theory. While his work charts similar concerns, he does not delve into the realm of astronomy, except when addressing astrophysics and the link between the writings of Eddington and the works of Georges Bataille. Parkinson essentially completed some of the "hard science" leg work for this project and addressed the works

⁸ Jean Clair, ed., *Cosmos: From Romanticism to the Avant-garde* (Montreal: The Montreal Museum of Fine Arts, 1999).

⁹ Jay Belloli, ed., *The Universe: A Convergence of Art, Music, and Science* (London: Reaktion Books, 2001).

¹⁰ Gavin Parkinson, *Surrealism, Art, and Modern Science: Relativity, Quantum Mechanics, Epistemology* (New Haven, CT: Yale University Press, 2008).

of artists and Surrealist thinkers, such as Salvador Dali and Roger Caillois, whose interests, while deeply engaged with the physical sciences, lie outside the scope of this project. Furthermore, his study of artists vital to my own project, including Matta, Paalen, and Ernst, has provided guidance for my own exploration of their works. In the end, Parkinson's work serves as a model for this dissertation and demonstrates convincingly the importance of science for Surrealism.

Aside from Parkinson's text, another contribution to the field of astronomy and culture has served as a primary model for this project. Holly Henry's *Virginia Woolf and the Discourse of Science: The Aesthetics of Astronomy* (2003) examines the way in which contemporary astronomical discoveries helped shape Woolf's literature as well as that of other British writers from the period.¹¹ Henry's study establishes important links between the popular works of Sir James Jeans and Woolf's writing. She also insists upon the importance of the work of astronomical popularizers for authors and other creative individuals during roughly the same time frame under consideration in this dissertation. While her text focuses on popularization in the United States and Britain, Henry highlights the importance of other means of popular access to astronomical information such as better telescope technology. In her discussion of popular science, Henry acknowledges that there was a broad spectrum of media and literature on astronomy available during the first half of the twentieth century, and that these resources encouraged a widespread fascination with the subject across social classes. In sum,

¹¹ Holly Henry, *Virginia Woolf and the Discourse of Science: The Aesthetics of Astronomy* (New York: Cambridge University Press, 2003).

Henry's study reveals the way in which scientific discourse filters into creative endeavors via the efforts of popularizers and the media.

Scholarly inquiry into the role of astronomy in Surrealism has occurred primarily in monographic studies of single artists. Lynn Gamwell includes a few pages devoted to Surrealists imaging the universe in her chapter "Surrealist Science" from the larger volume *Exploring the Invisible: Art, Science, and the Spiritual* (2002), but her text is a vast survey that addresses a full range of modernist art movements.¹² She does, however, briefly mention a number of Surrealist artists who attempted to depict changing conceptions of cosmic space, especially in light of Einstein and the space-time of Relativity Theory. This brief assessment of such concerns—along with the work of Parkinson—serves as a model for portions of Chapter Four.

Scholarly writing on Surrealism and astronomy primarily has generally occurred in monographs on artists only loosely affiliated with the Surrealist project. Joseph Cornell has been the focus of much of the work in this area, largely because of his documented fascination with the Hayden Planetarium and his use of star charts and other astronomical print sources in the construction of his boxes. Kirsten Hoving's *Joseph Cornell and Astronomy: A Case for the Stars* (2009) offers the most thorough treatment of this topic.¹³ She not only manages to track and document the wealth of astronomical

¹² Lynn Gamwell, *Exploring the Invisible: Art, Science and the Spiritual* (Princeton NJ: Princeton University Press, 2002).

¹³ Kirsten A. Hoving, *Joseph Cornell and Astronomy: A Case for the Stars* (Princeton, NJ: Princeton University Press, 2009). See also Kirsten A. Hoving, "The Surreal Science of Soap: Joseph Cornell's First Soap Bubble Set," *American Art* 20 (Spring 2006): 14-35. Hoving has also published on astronomical

ephemera and publications collected by Cornell during his lifetime, but she also offers analysis of Cornell's incorporation of these sources into his sculptural boxes and his experiments in film. Hoving's work, like that of Henry and Parkinson, has served as yet another important model for this dissertation project. The links between Cornell's oeuvre and astronomy have also been discussed by scholars Lindsey Blair and Diane Waldman.¹⁴

Although he never considered himself a member of the Surrealist movement, Alexander Calder exhibited with the group in the 1930s and 1940s. In her article "Alexander Calder: Cosmic Imagery and the Use of Scientific Instruments" and in subsequent publications, Joan Marter examines Calder's obsession with the cosmos and his production of his *Constellations* series.¹⁵ The 1976 Whitney Museum of Art exhibition *Calder's Universe*, along with the accompanying catalog, further investigates this use of astronomical themes in the work of the artist.¹⁶ Due to his interactions with the Surrealists—even if in a limited context—Calder likely served as an additional conduit of information on and enthusiasm for astronomical topics.

themes in the work of Jackson Pollock. These discussions were equally useful in determining the scope and tactics of this dissertation project. See Kirsten A. Hoving, "Jackson Pollock's 'Galaxy': Outer Space and Artist's Space in Pollock's Cosmic Paintings," *American Art* 16 (Spring 2002): 82-93.

¹⁴ Lindsey Blair, *Joseph Cornell's Vision of Spiritual Order* (London: Reaktion Books, 1998), 174-202; and Diane Waldman, *Joseph Cornell: Master of Dreams* (New York: Harry N. Abrams, 2002).

¹⁵ See Joan M. Marter, *Alexander Calder* (New York: Cambridge University Press, 1991); and Joan M. Marter "Alexander Calder: Cosmic Imagery and the Use of Scientific Instruments," *Arts Magazine* 53 (October 1978): 108-113.

¹⁶ Jean Lipman, ed. *Calder's Universe* (New York: Viking Press, 1976).

As will be clear in the pages that follow, the Surrealists' attraction to astronomy extended to its occult double, astrology, and the related field of the Tarot. To date there exists no solid, comprehensive survey of Surrealism's links to occult phenomena. Nadia Choucha's *Surrealism and the Occult* (1992) is a fragmented look at disparate examples of occult interests within the group.¹⁷ Scholars Alyce Mahon and M.E. Warlick have also broadly addressed the theme of Surrealism and the occult in shorter essays that prove much more useful than Choucha's account.¹⁸ The strongest available research on the Surrealist engagement with the occult largely takes the form of monographs on individual artists. Among these, Warlick's well-researched *Max Ernst and Alchemy: A Magician in Search of Myth* (2001), Janet Kaplan's *Unexpected Journeys: The Life and Art of Remedios Varo* (1988), and Susan L. Aberth's *Leonora Carrington: Surrealism, Alchemy, and Art* (2004) are the outstanding works of this type.¹⁹ However, these studies are mostly limited to a discussion of alchemy; while they make brief mention of the astronomy related practices of the tarot or astrology, they do not address these issues at length.

¹⁷ Nadia Choucha, *Surrealism and the Occult: Shamanism, Magic Alchemy, and the Birth of an Artistic Movement* (Rochester, VT: Destiny Books, 1992).

¹⁸ Alyce Mahon, "The Search for a New Dimension: Surrealism and Magic," in *The Meanings of Magic: From the Bible to Buffalo Bill*, ed. Amy Wygant (New York: Berghahn Books, 2006), 221-234; and M. E. Warlick, "Magic, Alchemy and Surrealist Objects," in *Magical Objects: Things and Beyond*, ed. Elmar Schenkel and Stefan Welz (Madison, WI: Galda + Wich Verlag, 2007), 1-32.

¹⁹ Susan L. Aberth, *Leonora Carrington: Surrealism, Alchemy and Art* (Burlington, VT: Lund Humphries, 2004); Janet Kaplan, *Unexpected Journeys: The Art and Life of Remedios Varo* (London: Virago, 1988); and M.E. Warlick, *Max Ernst and Alchemy: A Magician in Search of Myth* (Austin: The University of Texas Press, 2001).

OUTLINE OF THE DISSERTATION

The history of the popularization of astronomy is central to this dissertation and thus Chapter One explores the ways in which the Surrealists, and indeed any average Parisian citizen, would have had access to ideas related to the cosmos. It was in the later nineteenth century that a number of factors converged to make all things astronomical an increasingly prominent public fascination that would continue well into the twentieth century. I begin by looking at the efforts of two prominent figures in the French scientific community, François Arago and Camille Flammarion, both of whom sought to encourage public interest in astronomy via their publications and their larger public personas. Aside from Arago and Flammarion's popular texts, this chapter also discusses other venues for the transmission of scientific ideas, such as the rise of popular science magazines and the work of later scientific popularizers like Sir James Jeans and Sir Arthur Eddington. This chapter also acknowledges the way in which the advent of photography and other related visual evidence, including the twentieth-century invention of the planetarium, would have further encouraged popular knowledge about astronomy. Because the Surrealists and the larger public's conception of the universe would have been equally shaped by non-scientific sources, this chapter also briefly examines comic books, literature, and films that dealt with astronomical topics. Because popular notions of astronomy at times included the related occult practices of astrology and the tarot, a brief history of the nineteenth-century occult revival of these fields is also included.

With this popular history of astronomy established, Chapter Two seeks to identify Surrealist points of access to the ideas and issues outlined above. This is achieved in two ways. First, I argue for the daily presence of astronomical sites and locations in the lives of the Surrealists. Thus, this chapter discusses major Surrealist meeting places, homes, and studios and then reveals their proximity to major sites of astronomical interest in Paris. Second, I examine in more detail the 1937 opening of the Palais de la Découverte and pay special attention to the exhibition halls devoted to astronomy. Visited by certain members of the Surrealist group, the Palais revolutionized the display tactics of science museums and moved beyond traditional strategies of retrospect and display to create a venue for audience interaction and participation. Moreover, I suggest that these display tactics may have served as one model for the Surrealists' own exhibitions, most notably the 1938 Exposition Internationale du Surréalisme, staged eight months after the opening of the Palais de la Découverte.

The remaining three chapters examine the range of Surrealist visual responses to astronomy and related popular conceptions of the field. Moreover, these three chapters span a divide in responses from two different generations of Surrealist artists. Chapter Three looks at the works of two first-generation Surrealists, Max Ernst and Joan Miró. Linked to the movement from its very beginnings, these two artists demonstrate the most extensive borrowing from astronomy in their work. Both men include observable astronomical phenomena with easily identifiable representations of moons, stars, planetary bodies, and other elements.

Chapters Four and Five primarily examine a second- generation of Surrealist artists, who joined the group beginning in the mid-1930s. Surrealist art had rapidly expanded since the movement's inception to include not only works whose primary concern was the exploration of the unconscious mind and related automatic tactics, but also imagery that might best be described as simply the product of the individual imagination of a given artist. Among this second- generation of Surrealists, artists Remedios Varo, Oscar Dominquez, Matta, Wolfgang Paalen, Kurt Seligmann, and Leonora Carrington all engaged with astronomical themes in their work. In their exploration of the fantastic, these artists often conflated astronomical references with their exploration of the human imagination. For some of these artists, the heavens represented a visual playground for inventive fantasies; their work envisioned the wonders of outer space or dabbled in the mysteries of the astronomical occult. Still others were deeply engaged with a more careful study of the heavens and reflected a keen interest in and understanding of topics such as Einstein's Relativity Theory or the highly observational world of astrology. For these artists, the heavens were yet another imagined space for their Surreal musings.

Chapter Four seeks to highlight the metaphoric similarities between the greater Surrealist project of tapping into and exploring the unconscious mind and contemporary attempts to understand and visualize outer space. Artists such as Max Ernst, Remedios Varo, Oscar Domínguez, Matta, and Wolfgang Paalen all engaged with either the highly scientific concepts of Einstein's space-time and/or contemporary fantasies of other

planetary worlds and alien life forms. Chapter Five looks specifically at the astronomical occult, examining the way in which Seligmann, Varo, and Carrington were able to meld their fascination with astronomy and their interests in astrology and the Tarot—both occult practices that rely on astronomical observations and phenomena. Through both chapters, the writings and book collection of Breton will serve to unite the astronomical concerns of this later generation of Surrealists to the movement as a whole.

Chapter 1

Astronomical Visions: The Popularization of Astronomy and Related Phenomena in the Late Nineteenth and Twentieth Centuries

I do not know a treatise in which a survey of the *Universe*—using the word in its most comprehensive and only legitimate acceptation—is taken at all; and it may be as well here to mention that by the term “Universe,” wherever employed without qualification in this essay, I mean, in most cases to designate *the utmost conceivable expanse of space, with all things, spiritual and material, that can be imagined to exist within the compass of that expanse*.—Edgar Allen Poe, *Eureka*²⁰

L’Astronomie, on l’a souvent dit, est la Science la plus captivante qui soit, mais pour cela, il faut avoir bien compris ses elements essentials. *Astronomy, it is often said, is the most exciting of the sciences, but it must be understood according to its essential elements*.—E. M. Touchet²¹

By the time the first Surrealist manifesto was published in 1924, a strong public interest in astronomy existed in France. Over the succeeding two decades, this popular awareness would continue to strengthen in the wake of increased access to information on astronomical concerns in an even greater number of venues. In the popular scientific press, average citizens were encouraged to observe, explore, and even imagine the possibilities presented by the heavens above. The continued development of telescope technologies, astronomical photography, and other visual formats, such as the rise of planetaria, allowed scientific communities to easily communicate ideas and the latest

²⁰Edgar Allen Poe, *Eureka: A Prose Poem* (New York: Prometheus Books, 1997), 6.

²¹ E. M. Touchet, “La voûte celeste en 1920.” *La Nature* 2397-2398 (April 10, 1920): 83.

findings to an eager public audience. Moreover, the scientific community was not the only popularizer of astronomy. From science fiction found in comics and films to occult practitioners and publications on astrology and the Tarot, ideas on outer space and man's relation to the heavens were widely accessible.

With these diverse means of transmission, members of the public were able to construct their own understandings of the universe. As such, astronomy gained an added aura of imagined fantasy based to varying degrees in scientific fact, fictional musings, and esoteric mystery. Thus, for a lay person, the idea of astronomy could be as scientific or fantastical as he or she wished. Edgar Allen Poe, so admired by the Surrealists, wrote in his prose poem *Eureka*, that astronomy is both "spiritual and material," and ideas about the universe are without limits or qualifications.²² Furthermore, it was this lack of limitations and the intermixing of the scientific, the fantastic, and the occult that made astronomical topics, ideas, and imagery so appealing to the Surrealists.

ASTRONOMY: SCIENCE, IMAGINATION, OR BOTH?

Despite the now-common notion that a scientific pursuit must be based in purely objective findings, astronomy relied on some degree of imaginative conjecture as late as

²² Breton mentions Poe as a surrealist precursor in the movement's first manifesto of 1924. Breton writes, "Poe is Surrealist in adventure," but then soon after qualifies this pronouncement with the caution that Poe and the other artists listed "are not always Surrealists." Breton here seems to insist on the originality of the project he and his compatriots have signed on for. Poe and others can be predecessors but never Surrealists in their own right. Despite this distinction, it is clear that Breton values Poe and his literary output. See Breton, *Manifestoes of Surrealism*, 27.

the early twentieth century.²³ Thus, in the years just prior to the birth of the Surrealist movement, astronomy remained a field of varied scientific speculation that allowed theorists and scientists to “fill-in-the-blanks” when observational findings did not yield irrefutable or definite conclusions. It was this type of fantastic invention that would have certainly attracted the Surrealists to the field of astronomy.

The nineteenth-century shift to an idea of science as a field solely defined by careful experimentation and clear data sets did not occur as smoothly in many sub-disciplines as modern audiences often assume. To be sure, scientific objectivity is a mid-nineteenth-century construct, the result of empiricist and positivist philosophies that championed observable, sensory data as the primary evidence of scientific pursuits. This was certainly the case with astronomy. Historically, astronomers relied on human observation as the primary evidence for scientific theory and understanding, but unaided human observation and the resulting illustrations and records could not be divorced from some level of subjective inference. Even the advent of photographic technology did not immediately render the field wholly objective. This is particularly surprising, given that one of the earliest and most vocal supporters of the applications of photography for scientific purposes was the director of the Paris Observatory, François Arago. Unlike, for example, the camera’s adaptation to produce microphotographs, an early boon to the field of microbiology, photography did not see immediate widespread application in

²³ For a rich discussion of the rise of scientific objectivity around the mid-nineteenth century and specifically its relation to scientific images and illustrations, see Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007).

astronomy.²⁴ Simply put, early photographic emulsions were not sensitive enough to capture dim astronomical sources very well and did not allow for the same level of detail as that afforded by the human eye.²⁵ Most scholars agree that it was not until the 1880s that photography saw widespread, practical applications within the field. Even after this point, many astronomers continued to rely on hand-drawn observations well into the early twentieth century, and photography remained a secondary resource.

Given these issues with scientific objectivity and the dominance of drawn rather than mechanically produced evidence, it should come as no surprise that there were contentious debates within the field in the later nineteenth century regarding the confirmation of observed phenomena and details. Moreover, it was not uncommon for celebrated astronomers to augment their visual evidence with imagined details presented as fact. Perhaps the most famous instance of this mix of data and fantasy is the Martian canals debate, which arose in the late 1870s and continued well into the 1910s. Building upon a centuries-old debate on the plurality of worlds and further bolstered by increasingly improved telescope technology, astronomers turned their attention to

²⁴ For more information on the early applications of photography in science, see Susan Barger and William B. White, *The Daguerreotype: Nineteenth-Century Technology and Modern Science* (Washington D.C.: Smithsonian Institution Press, 1991); Ian Jeffrey, *REVISIONS: An Alternative History of Photography* (Bradford, UK: The National Museum of Photography, Film & Television, 1999); Ann Thomas, *A Beauty of Another Order: Photography in Science* (New Haven, CT: Yale University Press, 1998); Jennifer Tucker, *Nature Exposed: Photography as Eyewitness in Victorian Science* (Baltimore: The Johns Hopkins University Press, 2005); and Kelley Wilder, *Photography and Science* (London: Reaktion Books, Ltd., 2009).

²⁵ Daston and Galison, *Objectivity*, 179-182. See also Simon Schaffer, "On Astronomical Drawing," in *Picturing Science Producing Art*, ed. Caroline A. Jones and Peter Galison (New York: Routledge, 1998), 441-474.

conditions on the planet Mars.²⁶ This initial interest in Martian geography soon led to a consideration of the possibility of life on the planet. A number of noted astronomers and scientists began to observe and publish their findings regarding Martian topography, and by the later nineteenth century a lively debate surrounded the possible existence of so-called canals on the planet's surface.

Perhaps the greatest early proponent and self-proclaimed discoverer of the canals was Italian astronomer Giovanni Schiaparelli. Giovanni's niece, Elsa, would later see a career as a celebrated fashion designer, known for her collaborations with prominent Surrealists, including Salvador Dalí and Man Ray. Moreover, Elsa spent a great deal of her childhood gazing at the stars under the tutelage of her uncle.²⁷ Elsa would later incorporate astronomical elements in her fashion designs from the late 1930s—especially her Zodiac collection from 1938—the same years during which she collaborated with the Surrealist group. Elsa likely served as an additional conduit of astronomical ideas for those interested members of the group.

²⁶ Plurality of worlds is the common term attached to the literature, either scientific or popular, devoted to the possibility of life on other planets. This debate stretches back through ancient and medieval science but the term “plurality of worlds” was most famously and perhaps first used by the French Enlightenment philosopher and scientist Bernard le Bovier de Fontenelle in his 1686 publication *Entretiens sur la pluralité des mondes*. Due in part to his charming prose and the use of the French vernacular over the more academic Latin, Fontenelle's text saw widespread popularity but is often cited as lacking in substantial scientific evidence for its claims. For more on Fontenelle, Nina Rattner Gelbart's introduction to the 1990 translation is a useful resource. See Bernard le Bovier de Fontenelle, *Conversations on the plurality of worlds*, trans. H. A. Hargreaves (Berkeley: University of California Press, 1990), vii-xxxii. For a history of the plurality debate in the modern era, see Michael J. Crowe, *The Extraterrestrial Life Debate, 1750-1900* (Mineola, NY: Dover Publications, Inc., 1999); and Steven J. Dick, *The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science* (New York: Cambridge University Press, 1996).

²⁷ Palmer White, *Elsa Schiaparelli: Empress of Paris Fashion* (New York: Rizzoli, 1986), 24.

As director of the Brera Observatory in Milan, Italy, Giovanni Schiaparelli spent a good deal of his early career observing comets, asteroids and meteors. He gained some fame following the proposal of an origin theory for meteors as the result of comet degradation and dissolution—a theory that was later confirmed with further observation. However, Schiaparelli became infamous within the astronomical community following the 1877 publication of his observations of the Martian surface.

September 1877 saw near perfect viewing conditions for Mars; at the time Mars was in perihelic opposition, a phenomenon that only occurs every fifteen or seventeen years in which the planet's orbit make its closest approach to Earth.²⁸ Schiaparelli, along with a number of other prominent astronomers, took advantage of these conditions and produced extensive maps and drawings of the planet's surface. Despite the work of these other observers, it was Schiaparelli's findings that were soon met with widespread controversy.

Prior to his career in astronomy, Schiaparelli had initially trained as a civil engineer.²⁹ Not surprisingly, his maps and drawings reveal a level of careful precision and graphical veracity. Comparisons with other hand-drawn charts and observational maps from 1877 yield a whole range of results, from the intricate and precise to the vague but artfully rendered. Scholar William Sheehan compares Schiaparelli's drawings with those produced by English astronomer Nathaniel Green [Figs. 2 and 3], who gathered

²⁸ William Sheehan, *The Planet Mars: A History of Observation and Discovery* (Tucson: The University of Arizona Press, 1996), 14-15.

²⁹ Crowe, *The Extraterrestrial Life Debate*, 482.

data using a comparable telescope; Sheehan describes the two men's varied results as "left and right brain views of Mars."³⁰ Green's map has a more illustrative quality with masterful chiaroscuro that would have surely come from his earlier training as a portrait artist. Green's hazy, ill-defined surface features stand in sharp contrast to the plotted and painstakingly labeled "seas" and "canals" of Schiaparelli's maps.³¹

Green's more artistic rendering may have added an air of doubt to the validity of his findings. For many viewers, Schiaparelli's precision was widely interpreted as objective fact.³² This contrast in illustrative styles serves as just one example of the continued difficulties with objectivity in later nineteenth-century astronomy. Moreover, this reveals the way in which astronomers often embellished their findings and later presented them as objective, visual facts rather than subjective observations.

Popular interest in Schiaparelli's work also originated in the scientist's use of the Italian term "canali" to describe the surface features he had observed. While the word can connote either "channels" or "canals," the scientific press chose the more loaded term "canal," which implied an artificial construction and begged the question of what or who had produced these features. While Schiaparelli did not initially hazard a guess regarding

³⁰ William Sheehan, *Worlds in the Sky: Planetary Discoveries from Earliest Times through Voyager and Magellan* (Tucson: The University of Arizona Press, 1992), 89.

³¹ For more on the cartographic and scientific implications of Schiaparelli's observations and drawings as well as the popular dissemination of these findings, see K. Maria D. Lane, "Geographers of Mars: Cartographic Inscription and Exploration Narrative in Late Victorian Representations of the Red Planet," *Isis* 96 (December 2005): 477-506; and K. Maria D. Lane, *Geographies of Mars: Seeing and Knowing the Red Planet* (Chicago: University of Chicago Press, 2010).

³² Lane also argues that Schiaparelli's identity as a respected, trained astronomer led to his wider acceptance and perceived authority on the topic, especially when compared with Green's amateur observer status. See Lane, "Geographers of Mars," 485.

the origin of the canals, his initial publication led to an explosion of both popular and scientific responses as to what exactly these canals might be: either a natural occurrence or evidence of life on Mars, and all positions in between.³³

The controversy, however, was not simply rooted in confused terminology. Simply put, Schiaparelli's initial findings were not solely the result of objective scientific observation. Instead, he likely added to or embellished his map to best support the claims he would make in later publications. Schiaparelli's findings and some of the earliest photographs of the Martian surface stand in sharp contrast to one another. In 1905, American astronomer Percival Lowell published the first "successful" photographs of Mars [Fig. 4].³⁴ These images show just how little detail was visible of the planet's surface, even taking into account thirty years of enhanced telescope technology as well as the difficulties of adapting photography for astronomical observation. While Lowell ardently supported Schiaparelli's claims and even published extensively on the subject himself, his photographs reveal a Martian surface much closer to Green's earlier shadowy drawings.³⁵ Therefore, it seems clear that Schiaparelli's maps relied on imagined aspects of the Martian surface and he—whether knowingly or not—imbued his drawings with a level of detail that would support his publications and theories on the Martian topography and the possibility of life on Mars.

³³ Sheehan, *Worlds in the Sky*, 89.

³⁴ Tucker, *Nature Exposed*, 207.

³⁵ For more on Lowell's involvement in the Martian Canal Debate, see William Graves Hoyt, *Lowell and Mars* (Tucson: The University of Arizona Press, 1976).

It was in his written descriptions of the planet that Schiaparelli took the most creative license. In the years following his initial observations, the astronomer published multiple times on Mars, increasingly turning to a highly descriptive prose, full of flourishes and seemingly imagined details. In his first publication from 1878, Schiaparelli composed an almost book-length compendium of his observations, largely focusing on topographical details and the visual evidence provided in his map of the surface. But even in this early publication, he derived the names of prominent surface features from ancient mythology and geography, terminology that was certainly imbued with an air of fantasy. In the years that followed, Schiaparelli supported a germination theory for the apparent disappearance and/or division of earlier charted canals in his observations, making metaphorical comparisons to the actions of canals and other earthly biological and topographical processes. This theory, while certainly plausible, seems more an invention of the scientist to help account for the subjective differences and discrepancies between his charts and maps.

By the mid-1890s, Schiaparelli was suffering from increasingly poor eyesight and had all but retired from observational astronomy; he left his post as the director of the Brera Observatory in 1900.³⁶ However, Schiaparelli remained firm in his convictions and continued to publish on and describe a pluralist Mars, a planet fully capable of supporting life given the existence of his so-called canals. He would even go so far as to describe the canals as a type of planetary irrigation system. In an 1895 publication he further

³⁶ Sheehan, *Worlds in the Sky*, 90.

insisted that the canals were a built rather than naturally occurring feature, and he even posited the existence of Martian engineers.³⁷

Much of this sounds as though it has been culled from the pages of a science fiction text rather than that of a prominent and respected, if controversial, astronomer. Thus, even as late as the nineteenth and early twentieth centuries, the scientific practice of astronomers remained, to some degree, reliant upon an informed scientific imagination. Nothing that Schiaparelli published seemed too far out of the realm of possibility. While he had both opponents and supporters within the scientific community, he was never made an academic pariah and maintained a designation as a respected member of the scientific community.

Schiaparelli's enthusiasm for possible life on Mars continued until his death in 1910. Lowell, who had produced those early but judged successful images of the Martian surface in 1905, would adopt Schiaparelli's claims and produce his own set of observational claims for a habitable Mars. His texts and records, like Schiaparelli, were marked by a romantic tone that compared the Martian surface to the Arizona landscape and surroundings of his Flagstaff-based observatory.³⁸ Lowell fully believed in the existence of the canals until his death in 1916. While the controversy waned over the succeeding years, scientists would not fully dismiss the claims of a desert-like but habitable Martian surface until the 1965 flyby of the Mariner 4 spacecraft and the photographic evidence it provided. The images from Mariner revealed a bleak, likely

³⁷ Crowe, *The Extraterrestrial Life Debate*, 514.

³⁸ Sheehan, *Worlds in the Sky*, 92.

uninhabitable surface akin to the cratered terrain of the moon. Subsequent Mariner missions also confirmed that the atmosphere of the planet was likely incapable of supporting life. Schiaparelli's canals have since been dismissed as a perceptual anomaly, an illusion produced by both the available viewing aids and a tendency to rationalize intricate details as symbolic or simplified forms.³⁹

And yet, despite this eventual understanding of the Martian surface, the fact remains that Schiaparelli's theories did not rely upon the same types of wholly objective, observational findings or the replicable data sets that are often assumed as the foundations of modern science. Instead, a scientifically informed imagination helped to flesh out any perceptual gaps as it were, to speculate on the invisible or unknown realm of outer space when human faculties and other scientific aids fell short. It was this mix of fantasy and science that was perhaps the greatest attractor for the Surrealists. Much like their interests and research into psychology and Freud's work in psycho-analysis, astronomy was a defined and respected scientific field that allowed for some interplay with or acknowledgment of the imagination and fantasy. Moreover, this mix of science and fantasy would have certainly offered interested Surrealist artists a rich terrain for artistic invention.

³⁹ Sheehan, *Worlds in the Sky*, 93.

PROMOTING THE COSMOS: ARAGO, FLAMMARION, AND FRENCH PERIODICALS AS ASTRONOMICAL POPULARIZERS

The popularization of astronomy in France was largely the result of the efforts of two mid-nineteenth-century scientists in the field: François Arago and Camille Flammarion. Both men authored widely published texts that made astronomical information and observation better understood and appreciated by the general public. And, both were strong supporters of contemporary amateur observers and other public astronomical organizations. As historian Theresa Levitt has argued, the efforts of Arago and Flammarion at the Paris Observatory helped establish the institution as an important node in the network of scientific popularize. Through their programming and publication efforts, the Observatory was one of the most important generators of French popular knowledge and interest in astronomy.⁴⁰

Early on, Arago recognized the potential of photography for scientific pursuits and pushed the French government and scientific agencies to support development of the technology. Flammarion was keen to stimulate the French imagination when it came to astronomy and acknowledged the value of scientifically plausible fiction as a means to further arouse public interest. In addition to his more scientific manuals, Flammarion published popular literary works that carefully mixed his own scientific training and the latest theories from the field with the sensational world of science fiction. While today Flammarion is perhaps more widely recognized in histories of scientific popularization,

⁴⁰ Theresa Levitt, “‘I thought this might be of interest...’: The Observatory as Public Enterprise,” in *The Heavens on Earth: Observatories and Astronomy in Nineteenth-Century Science and Culture*, ed. David Aubin, Charlotte Bigg, and H. Otto Sibum (Durham, NC: Duke University Press, 2010), 286.

Arago's earlier dedication to educating the public and publishing accessible manuals for interested astronomical observers set a precedent for Flammarion's later efforts. Without the work of these two men, the French public would have likely remained ill-informed and largely ignorant of both the latest findings in the field and the wonders of the night sky above.

Linking the Surrealists to Arago proves difficult, and there are no definite sources that corroborate a Surrealist awareness of the scientist or his publications on astronomy. However, Flammarion was read by a number of the Surrealists, and illustrations from his texts even appear in works by artists associated with the movement, including Max Ernst and American artist Joseph Cornell. Scholars Elizabeth M. Legge and M.E. Warlick have both identified the use of illustrations from Flammarion's popular astronomy texts in Ernst's collage work.⁴¹ In her book length project on Cornell and astronomy, Kirsten Hoving discusses the importance of Flammarion's books for the artist, which he first borrowed from New York City gallerist Julien Levy, likely in the early 1930s; she also tracks the use of specific images culled from Flammarion's books in Cornell's collage objects.⁴²

Further evidence of the Surrealist group's exposure to Flammarion and his writings can be found in a December 1933 issue of their journal *Minotaure*. In an article simply titled "Enquête" or "Inquiry" authors André Breton and Paul Eluard reprinted

⁴¹ See Elizabeth M. Legge, *Max Ernst: The Psychoanalytic Sources* (Ann Arbor, MI: UMI Research Press, 1989), 102; and Warlick, *Max Ernst and Alchemy*, 245, n. 42.

⁴² Hoving, *Joseph Cornell and Astronomy*, 10-17.

responses to the following question: *Can you say what was the essential encounter of your life? How far did you think, and do you think, that this encounter was fortuitous? Necessary?*⁴³ Among the 140 respondents, of note is Gabrielle-Camille Flammarion, wife of the by-then deceased astronomer and herself an imitable astronomer.⁴⁴ Given the Surrealist interest in the occult, Breton and Eluard may have known Flammarion for his later writings on spiritism, reincarnation, and psychical research. But, Breton and Eluard's effort to contact Madame Flammarion speaks to their interest in her husband and his work.

Despite the fact that the Surrealists may have known little of Arago and his work as a popularizer, they grew up in a French society that was fascinated by and broadly aware of the wonders of astronomy. And, this late nineteenth- and early twentieth-century interest in all things astronomical can be linked to Arago's work for the Paris Observatory, first as an astronomer in residence and later during his tenure as the head of the observatory from 1834 until his death in 1853. It was Arago who first insisted that astronomical knowledge might interest the greater public. He used his position and tenure at the observatory to push for public scientific literacy. For Arago, the role of the scientist involved not only the pursuit of discovery and innovation but also the dissemination of these findings. Perhaps more revolutionary, Arago saw the audience for

⁴³ See André Breton and Paul Eluard, "Enquête," *Minotaure* 3-4 (December 1933): 101-116. For a translation of the original prompt and a list of participants, see José Pierre, ed., *Investigating Sex: Surrealist Research, 1928-1932*, trans. Malcolm Imrie (New York: Verso, 1992), 159-162.

⁴⁴ In her response, Madame Flammarion names her husband as the essential encounter of her life, but also alludes to the importance of astronomy, saying that both became a part of her future path in life.

science as not strictly limited to academics and professionals; a wider, albeit educated, public could be included in discussions of scientific pursuits and related intellectual inquiry.

After his early training in mathematics and physics, Arago worked for the French military as a surveyor working on issues of latitude and longitude. In 1808 he was briefly imprisoned by Spanish forces during his attempts to chart the islands near Majorca. As a reward for his efforts and bravery, Arago was first named to the Academy of Sciences in 1809, and soon after the emperor appointed the young scientist to a position as an astronomer at the Paris Observatory. Here he worked primarily on questions of longitude and measurements, reporting directly to Pierre-Simon Laplace, then head of the observatory. But, in 1813 Arago was also put in charge of a renewed effort in public programming at the observatory.⁴⁵

The public lecture series was first instituted in 1795, when the French government created the Bureau des Longitudes, associated with the Paris Observatory. The newly formed organization was charged with the task of offering an annual public course on astronomy.⁴⁶ While the lecture series existed prior to Arago's appointment as overseer to the program, it was never considered a successful offering until he revamped the curriculum and focus of these lectures. The young astronomer was aware of the public's reticence to engage with astronomy, due in large part to its associations with complex

⁴⁵ For more on Arago's early biography, see James Lequeux, *François Arago, un savant généreux: physique et astronomie au XIXe siècle* (Paris: EDP Sciences, 2008), 29-73.

⁴⁶ S. Dumont, "François Arago et l'Astronomie populaire," *L'Astronomie*, 117 (September 2003), 395.

mathematics and a required knowledge of ideas in optics and mechanics. Arago's lectures instead managed to make the field understandable. He preferred a lecture style that was free of jargon and complex scientific ideas, and he also hoped to teach both the history of the discipline and the latest findings in the field.⁴⁷ More importantly, Arago saw the lecture series as a means to debunk prevailing myths about astronomy and hoped to dispel public superstitions; his efforts helped educate the public and quell some fears with the return of Halley's comet in 1835.⁴⁸ The public response to Arago's reenvisioned lecture series was overwhelmingly positive. From 1831 it was so well attended that Arago was forced to petition the College de France to allow for use of their amphitheaters for the lectures; facilities at the Observatory were no longer sufficient.⁴⁹ Arago's achievements during these years, most notably his dedication to the lecture series, likely played a role in his appointment as head of the Paris Observatory in 1834.

Driven by the continued success of the lecture series and a perceived public desire for information on astronomy, Arago began compiling his notes in 1850 with the hopes of publishing a manual for the general public.⁵⁰ The four-volume *Astronomie Populaire* was published posthumously between 1854 and 1857. Arago scholar James Lequeux argues that Arago wrote primarily for a more expert or informed reader and did not

⁴⁷ Dumont, "François Arago et l'Astronomie populaire," 398; and Levitt, "I thought this might be of interest...", 288.

⁴⁸ Levitt, "I thought this might be of interest...", 292.

⁴⁹ The lecture series was finally moved to this larger venue in 1839, after Arago's continued insistence. See Dumont, "François Arago et l'Astronomie populaire," 396. For a lengthier description of Arago's public lecture series, see Lequeux, *François Arago, un savant généreux*, 380-384.

⁵⁰ Dumont, "François Arago et l'Astronomie populaire," 397.

provide the type of accessible text needed to reach a novice audience. He does, however, credit the scientist for his avoidance of topics that bordered on fantasy, a later hallmark of Flammarion's popular manuals and publications.⁵¹ Despite these critiques, Arago's approach marked a major shift in both the availability and quality of writing on astronomy for the public.

The two most commonly mentioned French predecessors to his four-volume publication are Fontenelle's 1686 *Entretiens sur la pluralité des mondes* and Jérôme Lalande's 1764 *Traité d'astronomie*. Fontenelle's text, in part, adopted the approach of a fiction writer, and information about our solar system and the possibility of extraterrestrial life was conveyed via a series of imaginary conversations between a sage philosopher and a curious marquise. Lalande's text, while partly aimed at a broad public readership, was still steeped in the language of technical astronomy that necessitated an expert reader. As with his approach to the lectures, Arago set out to engage the public, and he managed to compose a text that was more popular guide than technical textbook. More importantly, he was highly attuned to the topics that would best draw in a wide readership and sought to highlight contemporary astronomical phenomena that had garnered public interest.

Part history text and part observational guidebook, each volume addressed a separate topic. Volume one provided a broad introduction to optics, addressed the history of the telescope and other viewing aids, and then focused primarily on the stars, with

⁵¹ Lequeux, *François Arago, un savant généreux*, 383.

particular attention paid to William Herschel's recent contributions to stellar charting and observation as well as newly discovered nebulae. In the second volume, dedicated to the Milky Way galaxy, Arago broadly discussed theories of celestial mechanics in relation to earth's solar system. In this same volume, he also paid considerable attention—some 200 pages—to comets. This represented much of Arago's own research over his years at the Paris Observatory. He also benefited from the continued public fascination with comets, which was further heightened by the 1835 appearance of Halley's Comet. Volume three, simply titled "Terre" or "Earth," again addressed contemporary research at the Paris Observatory including Léon Foucault's work on the movement and rotation of our planet. Moreover, in this volume, Arago further capitalized on astronomical phenomena of recent public interest. He devoted a lengthy chapter to both lunar and solar eclipses and discussed eclipse events of 1842 and 1851, which many of his readers had witnessed. Finally, in volume four, Arago discussed the other planets in our own solar system, highlighting newly discovered satellites and moons as well as up-to-date knowledge on the composition and topography of each planet. In sum, Arago produced a text that aimed to engage contemporary audiences by recalling recent efforts in the field and emphasizing easily viewed and widely seen happenings, such as comets and eclipses. In doing so, he managed to equip his readers with the scientific and historical information necessary to understand such phenomena.

Beyond his work to popularize astronomical research and knowledge, Arago's greatest achievement in making the cosmos more accessible was his support for

photography and its early applications for science. Following Louis Daguerre's production of viable photographic images in the form of the daguerreotype around 1837, Arago was quick to recognize the possible applications for scientific observation and calculation. In 1839 he passionately spoke to the French Academy of Sciences in favor of continued support for Daguerre's process by appealing to both scientific and nationalistic concerns. He heartily encouraged monetary support from not only the Academy but also the French state, and he argued that sponsorship of the new medium would serve as a means to bring attention to French scientific ingenuity and progress. He even pushed for free access to the new technology, hoping to avoid a monopolization of the market by Daguerre. In his speech, Arago recalled recent French projects of documentation, including the work to catalogue artifacts acquired during the French occupation of Egypt. He pondered the lightened workload of archaeologists and historians had they had access to photography for logging these objects, and highlighted the photograph's ability to mechanically and objectively record images.⁵²

Despite this unfettered support, Arago was well aware of the limitations of the new medium. Early daguerreotypes produced for astronomical purposes captured images primarily of the sun and the moon.⁵³ While visually stunning, the images were not particularly useful in terms of new or unknown information and led to no major

⁵² Stephen F. Eisenman, *Nineteenth-Century Art: A Critical History*, 4th ed. (New York: Thames and Hudson, 2011), 275.

⁵³ For an excellent, if brief, discussion of these issues and a collection of supporting images, see the section on the telescope in Corey Keller, ed., *Brought to Light: Photography and the Invisible, 1840-1900* (New Haven: Yale University Press, 2008), n.p.

discoveries in the field. With the lengthy exposure time necessitated by the daguerreotype process, astronomers struggled early on to compensate for the rotation of the earth and were slow to record other visible phenomena—stars, planets, and the like—using the technology.⁵⁴ Even so, while not valuable for scientists, these early astronomical photographs were highly regarded by the public; images of the moon shown at the 1851 Crystal Palace Exhibition in London caused a stir among viewers and the later adapted cartes de visites, which were widely collected, featured a number of images of the sun and moon. Realizing the allure of astronomical photographs, Arago pushed for the inclusion of a lithographic copy of Léon Foucault and Hippolyte Fizeau's photographs of sunspots in his *Astronomie Populaire*.⁵⁵ Thus, Arago's support of photography, while linked to the medium's perceived value for the scientific community, also stemmed from his awareness of photography's popular appeal and the benefits for his attempts at astronomical popularization.

Following in the footsteps of Arago, Camille Flammarion worked to further encourage the French public's growing interest in astronomy through his publication of astronomical manuals as well as related literary experiments. By mixing science with the appeals of fiction writing, Flammarion managed to make astronomy even more widely accessible and exciting for the public. This dedication and approach marks, as scholar

⁵⁴ Musée D'Orsay, *Dans le champ des étoiles: Les photographes et le ciel 1850-2000. Paris 16 juin-24 septembre 2000 and Stuttgart Staatsgalerie 23 décembre 2000-1er avril 2000* (Paris: Éditions de la Réunion des musées nationaux, 2000), 13.

⁵⁵ Mary Warner Marien, *Photography: A Cultural History* (Upper Saddle River, NJ: Prentice Hall, 2011), 33-34.

Bernadette Bensaude-Vincent has noted, the perfect tact for a scientific popularizer whose main impetus should be, above all, to entrance an audience with the wonders of science in a meaningful and enjoyable format.⁵⁶ And, while Arago certainly made inroads for popular science by adapting the approach of scientific publishing to better reach a less-informed readership, Flammarion perfected this tactic with the addition of textual flourishes and fanciful detail.⁵⁷

Born in 1842 in the small community of Montigny-la Roi, southwest of Paris, Camille Flammarion showed early promise academically. He was particularly enthusiastic about astronomy as a child, after having viewed a solar eclipse in 1847 and then again in 1851—the same eclipse event that Arago had featured in his *Astronomie Populaire*.⁵⁸ Beginning at the age of eleven, Flammarion kept a log of his astronomical observations. Even while completing an apprenticeship in engraving, he would continue to self-educate on astronomical history and phenomena. Despite lacking formal training in the field, Flammarion also felt an early need to share his growing knowledge and by the age of sixteen had penned his first two manuscripts; one on the moon would never see publication, but the other, with some revisions, would be published much later in 1885 as *Le Monde avant le creation de l'homme* [The World before the Creation of Mankind].

⁵⁶ Bernadette Bensaude-Vincent, “Camille Flammarion: Prestige de la science populaire,” *Romantisme: Revue du 19e Siècle* 3 (1989): 96-97.

⁵⁷ For a more thorough analysis of Flammarion adaptation of the tactics of fiction writers for his scientific prose, see Danielle Chaperon, *Camille Flammarion: Entre astronomie et littérature* (Paris: Éditions Imago, 1998).

⁵⁸ For a brief but useful biography of Flammarion, see Brian Stableford’s introduction to his translation of Flammarion’s *Lumen*. Camille Flammarion, *Lumen*, trans. Brian Stableford (Middletown, CT: Wesleyan University Press, 2002).

This same manuscript also provided Flammarion's first introduction to the world of professional astronomy and led to a meeting with Urbain Le Verrier, then head of the Paris Observatory. Flammarion would begin his career as an assistant with the Bureau de Calculs but found that he greatly missed astronomical observation as well as writing. In his spare time he began work on his 1862 publication, *La Pluralité des mondes habités* [The Plurality of Habitable Worlds]. Initially a short, fifty-four page booklet, a second edition in 1864 had ballooned to a 570-page tome on the possibility of life on other planets. This text was the first major accomplishment in Flammarion's work as a scientific popularizer. It saw immediate success and led to additional work as a contributor for popular science magazines. More importantly, however, this text marked Flammarion's first foray into a writing style that while firmly grounded in the latest scientific findings and evidence was given new life with a style and tone more commonly associated with fiction writing.

On the title page to his 1862 edition of *La Pluralité*, Flammarion rather boastfully referred to himself as not only a professor of astronomy and a member of many prestigious academic societies but also as a *former* scientist, or *calculateur*, associated with the Paris Observatory.⁵⁹ Whether Urbain Le Verrier asked the young author and scientist to leave or Flammarion left of his own accord is uncertain, but the older head of the observatory was certainly vexed by the imaginative writing style evidenced in

⁵⁹ Crowe, *The Extraterrestrial Life Debate*, 378. Flammarion refers to himself as "Ancien calculateur à l'observatoire imperial de Paris, professeur d'astronomie, membre de plusieurs sociétés savantes, etc."

Flammarion's *La Pluralité*.⁶⁰ For many scientists, the threat of losing continued association with a respected observatory and the academic authority that this position bestowed would have certainly caused a retraction or a revised tactic in future publications.⁶¹ But, for Flammarion, his true calling lay in helping amateur enthusiasts and the general populace to access astronomical information in an understandable and entertaining format. Rather than rein in his fantastical prose, Flammarion continued to publish works in much the same vein; subsequent texts were increasingly imaginative but also rooted in recent scientific findings.

Flammarion continued to adapt and improve upon this mixture of fantasy and science in his publications from the late 1860s and 1870s. For example, his text *Lumen*, first published as a part of a larger collection in 1872 and later as a single volume in 1887, was composed as a series of conversations between a young man, Quarens, and a mysterious cosmic spirit, the Lumen of the title.

The comparisons to Fontenelle's earlier work on the plurality of worlds are easy to recognize here. However, Flammarion's invention of the spirit-form Lumen rather than the sage philosopher of Fontenelle's text demonstrates his tendency toward the fantastic. Moreover, the conversations between the two characters involve a level of dramatic flair and speculation more associated with fiction writing. Flammarion includes

⁶⁰ Bensaude-Vincent states that Le Verrier fired Flammarion, while other sources—Stableford and Crowe—account for some continued associations with the Paris Observatory. See Bensaude-Vincent, "Camille Flammarion: Prestige de la science populaire," 93.

⁶¹ Likely based on his popular success, Flammarion would be allowed access to the telescopes at the Paris Observatory for various projects but would hold no formal designation or position. See Crowe, *The Extraterrestrial Life Debate*, 384.

imagined planetary worlds and their alien life forms—as described by Lumen—and further speculates on the existence of time travel and reincarnation. This content seems the traditional fodder of science fiction and not that produced by a respected scientist. Yet, Flammarion also relied heavily on new scientific discoveries and ideas as the jumping off point for this speculation. As scholar Brian Stableford has noted, Flammarion was well attuned to contemporary work in evolutionary biology, especially the work of French scientist Jean-Baptiste Lamarck, and he managed to integrate Lamarckian theory into his speculations on alien life forms.⁶²

In later books from the 1880s and 1890s, Flammarion perfected similar tactics. *La Fin du monde* [*Omega: The Last Days of the World*] from 1893 addresses the increasing anxiety, derived from contemporary work in thermodynamics, about a possible cosmic catastrophe that would see the end of humankind. Flammarion sets his novel in the twenty-fifth century, and the scientists and actors of his drama discuss the possible outcomes following the collision of a comet with Earth. While some of these discussions take on a dry, less fantastic tone—the language of his scientist actors—Flammarion provides a sensational tale wherein the comet narrowly misses earth, leading to further and rather poetic discussions on the course of human life and the inevitability of death. The addition of dramatic illustrations further suffuses the text with the air of fiction writing and not that associated with scientific and academic discourse. In both *Lumen* and *Omega*, as well as other similar tomes, Flammarion managed to capture the public

⁶² Stableford discusses this in his introduction to the translation of *Lumen*. See Flammarion, *Lumen*, xiv-xxvii.

imagination with fantastic tales and a charismatic prose, while at the same time expounding on contemporary work in astronomy and science at large and educating the populace on the wonders of the heavens.

Perhaps Flammarion's greatest accomplishment as a popularizer was his guide book to the heavens, *Astronomie populaire*, first published in 1880.⁶³ Flammarion had always seen Arago as a model for his success as a popularizer.⁶⁴ Despite publishing widely in popular and academic journals, not to mention his experiments in scientific fiction writing, such as *Lumen* and *Omega*, he still felt the need to publish a lengthier and instructional astronomical manual like that of his predecessor. Much like Arago, he set out to create a guide that would enthrall readers rather than stymie them with complex mathematics and scientific jargon. The 1880 manual and subsequent editions provide a voyage through the cosmos made richer by its inclusion of beautiful illustrations and imagery and a language that recalled early mythology and astrology.⁶⁵ Flammarion's prose never becomes bogged down in precise measurements and instead takes on the same vernacular tone found in popular travel writing and guides. Flammarion's text

⁶³ One reader was so impressed by Flammarion's efforts in this manual that he gifted the astronomer with an estate in Juvisy, just outside Paris, where Flammarion would build his own observatory and telescope in support of his observational work. This new site erased the need for a continued relationship with the Paris Observatory. See Flammarion, *Lumen*, xi.

⁶⁴ The dedication of *Astronomie populaire* reveals just how much Flammarion revered Arago. It reads, in translation: "To the Immortal Genius of Copernicus, Galileo, Kepler, and Newton who opened to mankind the paths to infinitude and to François Arago founder of popular astronomy..." Translation derived from the following English language edition: Camille Flammarion, *Popular Astronomy: A General Description of the Heavens*, trans. J. Ellard Gore (New York: D. Appleton and Company, 1907).

⁶⁵ Bensaude-Vincent, "Camille Flammarion: Prestige de la Science Populaire," 99. The 1907 English translation by Gore (see note above) includes some 288 separate illustrations to better engage readers.

would become the standard amateur observational manual for decades after its initial publication and would see numerous revised editions, reprintings, and translations.⁶⁶

In addition to the popular manuals of Arago and Flammarion, from the mid-nineteenth century forward the public could access a great deal of information on astronomical ideas and phenomena within the popular scientific press. These publications not only tailored their content and language to make scientific discourse more widely accessible, but more importantly served to encourage the activities of amateur scientists and enthusiast groups. A whole range of authors contributed to these efforts, and key figures in these earlier efforts at popularization, like Flammarion, saw the popular scientific press as yet another venue to help engender a widespread popular appreciation for astronomy. For a low price and in a widely available format, most any interested and minimally educated person could learn to intelligently look up at the night sky or better inform themselves on the latest findings within the scientific community.⁶⁷

The genesis of the popular scientific press in France arguably dates to the 1840 launch of *La Revue scientifique*, which aimed to make the latest findings of science accessible to a wider, public audience and imagined itself as distinctly different from the

⁶⁶ As late as the 1960s, a much-revised edition, by then simply titled *The Flammarion Book of Astronomy*, was being published in both French and English translations. See for example, Camille Flammarion, *The Flammarion Book of Astronomy*, ed. Gabrielle-Camille Flammarion and André Danjon (New York: Simon and Schuster, 1964).

⁶⁷ For more on the nineteenth-century development of popular science periodicals in France, see Susan Sheets-Pyenson, "Popular Science Periodicals in Paris and London: the Emergence of a Low Scientific Culture, 1820-1875," *Annals of Science* 42 (November 1985): 549-572.

official proceedings and publications of the nation's Académies-des Sciences.⁶⁸

Following up on *La Revue scientifique* other similar periodicals were created throughout Europe and America, including *Scientific American* in 1845 and Britain's *The English Mechanic* in 1865. In 1873 French readers could also turn to the newly launched *La Nature: Revue des sciences et de leurs applications à l'art et à l'industrie*. All of these journals served to nourish a popular appetite for scientific knowledge, paralleling the popularization efforts of Arago and Flammarion. As we shall see, the imagery in Surrealist collage works, especially those produced by Max Ernst, reveals more than a passing fascination with popular science periodicals among members of the Surrealist circle.⁶⁹

By the time the Surrealists were active in Paris from the early 1920s to mid-1940s, *La Nature* continued as a major player in the field of popular science publications. Originally offered in a weekly format, beginning in the early 1920s the journal was available every two weeks. While the journal saw a disruption in publication at the onset of World War II in 1939 followed by a very limited publication schedule during the war years, it would survive until the early 1960s, when the periodical underwent a number of name changes followed by a subsequent merger with *La Recherche* in 1972.

⁶⁸ Yuri V. Novozhilov and Jacques G. Richardson, "Fifty Years After the Death of Flammarion, The Science Popularizer," *Journal of Technical Writing and Communication* 6 (1976): 90.

⁶⁹ For an analysis of Ernst's borrowings from *La Nature*, see Charlotte Stokes, "The Scientific Methods of Max Ernst: His Use of Scientific Subjects from *La Nature*," *The Art Bulletin* 62 (September 1980): 453-465. Ernst's use of this imagery and his interest in scientific subjects will be discussed at length in Chapter 2.

Although other periodicals certainly vied for the attention of the greater French popular readership, *La Nature* boasted a highly successful format with its beautiful illustrations and photographic images, mainstay columns, and contributions from major scientists in their respective fields. Among these contributors, Flammarion often wrote for the journal. In an article from the February 21, 1920 issue, Flammarion details recent work by radio pioneer Guglielmo Marconi and suggests the possible application of radio communication to interplanetary communication.⁷⁰ Flammarion even asks whether Martian inhabitants are currently trying to make contact with earth via radio waves and claims that earth is not alone in the universe, insisting on the existence of extraterrestrial life forms. His article reveals his investment in the continuing Martian canal debates, and he roots his prose in contemporary scientific discourse despite the seemingly fantastic ideas and content. More importantly, this example reveals the way in which the information presented in a popular scientific periodical like *La Nature* carefully skated the boundary between science and science fiction, a tactic that would have greatly interested the Surrealists.

An examination of the content of *La Nature* from 1920 to 1950 further reveals an entire range of accessible information on astronomical concerns. These include short, regular entries that served to record the latest findings of the academic scientific community and announced new discoveries and approaches by astronomers in France and abroad. Lengthier articles on astronomical topics regularly appear in the periodical.

⁷⁰ See Camille Flammarion, “La Planète Mars et les communications interplanétaires,” *La Nature* 49 (February 21, 1921): 119-122.

These articles almost always enhanced written content with photographs, illustrations, and diagrams. With few exceptions, almost every issue from this date range included some mention of astronomy—whether in the short announcements, in longer articles, or in each issue’s supplement which featured the “Bulletin Astronomique,” a visual guide to the heavens for amateur observers and readers.

The “Bulletin Astronomique” appeared at least once monthly and in most cases accompanied every issue; the column provided readers with star charts to aid in observations of the night sky and highlighted any special viewing opportunities for the upcoming month. From 1920 to 1939, Emile Touchet authored the column. Touchet was an associate of Flammarion’s and served as a secretary and contributing member to the Société Astronomique de France, beginning in 1902. Founded by Flammarion in 1887, the society set out to disseminate astronomical knowledge to the general public and served to promote the work of amateur observers, work which they saw as instrumental for scientific progress in the field. While the society also sponsored their own popular periodical, *L’Astronomie*, the involvement of members with other magazines, like *La Nature*, matched their mission to stimulate astronomical knowledge, observation, and discovery. *La Nature* also often reprinted short articles that originally appeared in *L’Astronomie*. This too reveals the dedication of the Société Astronomique de France to the cause of popularization and reveals an interesting kinship and set of shared publication practices among major popular science periodicals. *La Nature* and

L'Astronomie worked together to meet the public appetite for astronomical information and news.

Using “The Bulletin Astronomique,” any reader was relatively well equipped to perform simple at-home observations. The column not only encouraged readers to observe astronomical phenomena, but provided them with the knowledge to understand what they observed. In an April 1920 supplemental article that accompanied the bulletin, Touchet comments on the growing number of people with access to optical instruments—from small at-home telescopes to open admissions at public observatories—and he encourages the interest of amateurs.⁷¹ With a proper understanding of astronomical fundamentals and the appropriate tools and charts, he argues, anyone can look up at the heavens with more than simple fascination and understand what he or she might observe.

“The Bulletin Astronomique” would continue to serve as an easily accessible guide to intelligent observation for the next two decades. Following the 1939 disruption of publication, amateur astronomer and astronomical illustrator Lucien Rudaux took over the column. Toward the end of the war years, when the journal was forced to substantially shorten the length of the publication, the guide was retitled “Le ciel en...” under the direction of Rudaux. In 1948—the same year that the periodical shifted to a monthly publication schedule—astronomer Georges Fournier took over authorship of the column. Despite these changes, the column’s impetus remained the same: to educate and

⁷¹ Touchet, “La voûte celeste en 1920,” 83.

inform interested readers about astronomical observations and guide readers to look for and understand specific cosmic phenomena.

The bi-monthly and later monthly, illustrated magazine *La Science et la vie* first appeared in 1913 and featured a format similar to the American magazine *Popular Mechanics*, which had debuted in 1902. While primarily focused on the latest technology and science's applications for daily life, volumes of *La Science et la vie* published between 1920 and 1950 regularly featured articles related to astronomical observation and discovery. Most detailed the actual instrumentation and experimentation of scientists working in the field. For example, the June/July 1922 issue featured an eleven-page article describing recent experimental and observational confirmations of Einstein's theories.⁷² The author's intention was not to explain fully Einstein's theories for his lay audience but instead to explain the way in which newly available telescope technology had led to confirmation of Einstein's theoretical claims. The focus of *La Science et la vie* was to inform, but the journal, during these years at least, did little to educate a reader on observation. However, the magazine was notable for its wealth of visual content. Each issue reproduced photographs, illustrations, and diagrams of new technology and scientific phenomena. The periodical was also notable for attracting well-known astronomers to author short articles, thus stressing the professional astronomical community's support of amateur knowledge and observational pursuits. Following the death of her husband in 1925, Mademoiselle Gabrielle-Camille Flammarion—an

⁷² Léon Brillouin, "Les theories d' Einstein et leur verification expérimentale," *La Science et la vie* 63 (June/July 1922): 19-30.

important astronomer and observer in her own right—became an occasional contributor to the magazine. She penned articles that detailed not only contemporary astronomical concerns but also work performed at the Juvisy Observatory, which she helped oversee at the time. Articles by Mme. Flammarion appear beginning in the September 1926 issue, with her last contribution dating to August 1931.

In addition to *La Nature* and *La Science et la vie*, other popular science periodicals would have offered interested readers access to astronomical information. *L'Astronomie* largely addressed an audience of specific astronomical enthusiasts and members of the Société Astronomique de France, but it certainly would have been available for purchase at most Paris newsstands and booksellers. Other titles, including the aptly named *Cosmos: Revue des sciences et de leurs applications* and the illustrated *Science et voyages*, would have offered additional astronomical information aimed at a popular audience.⁷³ While astronomical content in *Science et voyages* was infrequent at best, this image-focused publication would have likely attracted the eye of a Surrealist reader interested in science more broadly speaking.

The monthly magazine *Je Sais tout: La Grande Revue de vulgarisation scientifique*, as the title suggests, focused primarily on popularization by featuring short fiction pieces that celebrated science as well as brief articles on the larger theme of exploration and voyages. The interior cover and title page of each issue touted a diverse range of famous contributors, including Marie Curie, Thomas Edison, as well as writers

⁷³ Issues of *Cosmos* were almost totally unavailable for analysis and perusal in the library collections utilized for this project (the Bibliothèque Nationale d'France, Paris and the collections at the University of Texas at Austin).

Rudyard Kipling and Arthur Conan Doyle. Published between 1905 and 1939, *Je Sais tout* was aimed at an adult readership; the audience of this publication helps distinguish it from contemporary comics and pulp fiction periodicals that took a more fantastic approach to scientific knowledge than other periodicals discussed.

During the 1920s brief articles dedicated to astronomical concerns appeared in *Je Sais tout* with some frequency. The tenor of these short pieces—compared with other contemporary magazines—seemed aimed at audience wonderment rather than information and instruction. Flammarion contributed two short articles during these years. A February 1922 text entitled “Le monde invisible et la science,” begins by exploring the range of invisible phenomena in the sciences such as Hertzian waves but then transitions to a discussion of Flammarion’s more recent study of telepathy and possible applications for communicating with the dead.⁷⁴ An October 1924 issue features yet another article penned by Flammarion—just months before his death in June 1925—entitled “Les Dernières nouvelles de la planète Mars.”⁷⁵ Here the astronomer describes current work at the Juvisy Observatory with much of the discussion devoted to his work on the Martian canals debate. The rather fantastic nature of these two articles by Flammarion fit well with the aims of the journal, which hoped to build a general interest in science via its most remarkable phenomena. By 1928, while not explicitly stated in the publication, *Je Sais tout* turned away from a celebration of science more broadly

⁷⁴ Camille Flammarion, “Le Monde invisible et la science,” *Je Sais Tout: La Grande Revue de vulgarisation scientifique* 194 (February 1922): 60.

⁷⁵ Camille Flammarion, “Les Dernières nouvelles de la planète Mars,” *Je Sais Tout: La Grande Revue de vulgarisation scientifique* 223 (September 1924): 585.

speaking and instead focused on the practical, technological applications of scientific research. As a result, it primarily featured imagery and short articles on the latest machines and inventions for both home and industrial applications. Despite this apparent shift, *Je Sais tout* would have served as yet another popular resource for the public at large and may have even garnered an audience of Surrealists working during the 1920s.

Beginning in the mid-nineteenth century, both the manuals made popular by Arago and Flammarion and the broader popular scientific press translated astronomy and related concerns for a lay audience. These texts helped stimulate the valuable work of amateur observers and, more importantly, encouraged a public fascination with all things astronomical. Arago set forth a course for scientific and astronomical popularizers that emphasized the celebration of astronomy divorced from the tedious and seemingly foreign language of higher mathematics and physics. Both he and Flammarion dedicated large portions of their careers to making astronomy understandable and, indeed, emphasizing the visual content of the science. These two men relished the fact that so many people stared up at the night sky in wonderment and sought to equip these viewers with the knowledge to understand what they saw and how it related to the latest findings in the field of astronomy. Popular science periodicals continued the task of informing the lay public. Their widespread availability and cheap publication price seemingly insisted that science was no longer solely the realm of the intellectual elite and that any curious individual could enjoy scientific pursuits and knowledge. When read in combination with these and similar efforts at popularization, the preponderance of astronomical

images created by artists associated with Surrealism, can in part be explained by this healthy popular interest in the field of astronomy.

IMAGING THE COSMOS: ASTRONOMICAL PHOTOGRAPHY AND PLANETARIA AS POPULARIZERS

Perhaps the greatest advancement for astronomy in the later nineteenth and early twentieth centuries was the arrival of new imaging practices that served to document the work of astronomers. The gradual improvement of both camera and telescope technology at the end of the nineteenth century led to widespread applications for astronomical study and discovery. As a result astronomical photographs offered more and more accurate imagery that served not only to authenticate scientific findings but also to stir popular interest in the field.

With the development of such imaging technologies the lay public no longer had to rely on the subjective illustrations, simplified diagrams, and lackluster charts of earlier astronomical texts and discoveries. While scientific drawings certainly implied careful observation and supposed scientific truth, the mechanical, documentary nature of the photographic medium permitted more widespread popular acceptance of astronomical ideas and theories. Moreover, photography captured and documented phenomena invisible to the unaided human eye, previously only seen with a telescope. The resulting images made telescopic viewing more widely accessible for an audience that often lacked ready access to such observational aids and apparatuses.

As previously discussed, Arago was one of the first scientists to fully recognize and support the use of photography in a scientific context. In 1838, Louis Daguerre first produced images of the moon, and it was these images that helped inspire Arago and other members of the Paris Academy of Sciences to advocate for the application of this new recording medium in the sciences. However, Daguerre's early images revealed little in the way of unknown information about the moon's surface or other features. It was not the information that these images yielded but instead the very conception of the medium that led to photography's gradual acceptance as a boon for scientific observation. As scholar Ian Jeffrey has argued, photographers did not initially identify as artists and the technical know-how and supposed mechanical truth of the resulting images led to a larger cultural understanding of the photographer as a type of scientist.⁷⁶

In the years after Daguerre's initial images, scientists struggled to combat problems inherent to the photographic medium. Issues of scale, movement, and exposure time confounded many astronomers who were early adopters of photography for observational purposes. To capture an image, an astronomer needed the mechanical skill to convert a preexisting telescope so that the photographic plate could be positioned at the eyepiece, similar to the way in which a slide is placed on a microscope. And, in order to compensate for the movement of the earth, astronomers had to develop new and highly accurate tracking mechanisms that could move both the telescope and the photographic

⁷⁶ Jeffrey, *REVISIONS*, 8.

plate during the lengthy exposure times necessitated by the daguerreotype process.⁷⁷ Many astronomers were simply unprepared to deal with the mechanical and technical challenges of adapting both their telescopes and the new photographic equipment. Additionally, many scientists felt these images were still no better in terms of visual quality or accuracy than that achieved in traditional illustrations and observation. These challenges led to an increasing number of astronomical amateurs working to improve instrumentation; among professional astronomers there was a much slower rate of acceptance of photography.⁷⁸ Even if a scientist managed to combat all of these challenges, the daguerreotype yielded a single image, and astronomers desired a way to both capture and easily reproduce their findings. Moreover, if the photograph was not highly exact or did not provide more detail than that available from traditional observation practices, there was little scientific benefit in these images. These frustrations and complications meant that, in its earliest formats, photography had little impact on the field of the astronomy in terms of new theories or findings.

Many of the earliest scientific daguerreotypes captured planetary bodies and other astronomical content. American John Draper captured the first detailed daguerreotype of the moon in 1840. Léon Foucault and Hippolyte Fizeau, both stationed at the Paris Observatory, produced the first successful images of the sun in 1845. And by the early

⁷⁷ Barger and White, *The Daguerreotype*, 84; and Thomas, *Beauty of Another Order*, 202.

⁷⁸ John Lankford, "The Impact of Photography on Astronomy," in *The General History of Astronomy, volume 4, Astrophysics and Twentieth-Century Astronomy to 1950: Part A*, ed. Owen Gingerich (New York: Cambridge University Press, 1984), 18.

1850s, images of greater and greater quality began to appear, including Americans John Whipple and George Bond's moon daguerreotypes. Despite their scientific limitations, these images generated widespread popular interest in astronomy.⁷⁹

With the development of wet collodion around 1851, some of the earlier problems associated with the application of photography in astronomical observation were solved; the new process featured shorter exposure times and the ability to produce paper copies. In the decades that followed, subsequent advancements in photographic processes gradually shortened exposure times but also allowed for the lengthier exposures necessary to capture more distant objects, such as stars and nebulae. The introduction of rapid dry plates in the 1870s allowed astronomers to expose the plate for as long as they wished and led to major developments in stellar photography.⁸⁰ By the 1880s, astronomers had extended the initial push to photograph large, neighboring celestial bodies, such as the sun and the moon, to include new projects to visualize, understand and chart the farthest reaches of the heavens.

France contributed greatly to initial work in astronomical photography at the end of the nineteenth century. Along with early efforts to photograph the moon and sun by Daguerre, Foucault, and Fizeau, a number of major French astronomers—many of whom

⁷⁹Warren de la Rue, a British astrophotographer working in the 1860s, noted that it was these early images that most inspired him as a youth and led him to pursue a career as an astronomer. See Keller, n.p. (de la Rue's claim is mentioned in Marie-Sophy Corcy's brief, two-page essay entitled "Telescopes" in this catalog). For more on De La Rue's role in the development of astronomical photography, see Holly Rothermel, "Images of the Sun: Warren De la Rue, George Biddell Airy and Celestial Photography," *The British Journal for the History of Science* 26 (June 1993): 137-169.

⁸⁰ Lankford, "The Impact of Photography on Astronomy," 23.

were associated with the Paris Observatory—oversaw efforts to photographically document the heavens. In anticipation of the 1874 and 1882 transits of Venus, France founded a government-sponsored commission to oversee observational efforts.⁸¹ Fizeau chaired the French commission and greatly advocated for the application of photography despite conjecture amongst fellow commission members. By reworking instrumentation first used for topographic mapping, Fizeau helped produce a refracting telescope with adapted photographic objectives and components for the 1874 observation expeditions. The resulting images were considered failures and yielded little in the way of enhanced findings. Subsequently, the French commission placed greater emphasis on traditional observation tactics for the 1882 campaign. However, Fizeau's efforts with instrumentation did not go unnoticed, and, in the ensuing years, the legitimacy of photography for astronomy grew in France. As scholar John Lankford notes, French astronomers, who were previously unwilling to put forth much effort toward the development of new photographic instrumentation and materials, increasingly dedicated themselves to such matters.⁸² The efforts by professional and amateur astronomers at the end of the nineteenth century, especially in France, helped advance the chemistry of photography and introduced new mechanisms for modifying existing telescope technology for photography.

⁸¹ Similar transit commissions were established in Germany one year earlier and the following year in Great Britain and the United States. For more on the history of international efforts surrounding the later nineteenth-century transits of Venus, see John Lankford, "Photography and the Nineteenth-Century Transits of Venus," *Technology and Culture* 28 (July 1987): 648-657. For a discussion of France's specific involvement in these efforts, see Jimena Canales, "Photogenic Venus: The 'Cinematographic Turn' and Its Alternatives in Nineteenth-Century France," *Isis* 93 (December 2002): 585-613.

⁸² Lankford, "Photography and the Nineteenth-Century Transits of Venus," 656.

Two major documentation projects, centered in France, benefitted from these advances. Perhaps France's greatest contribution to astrophotography was the Carte du Ciel project, initiated at the 1887 Astrographic Conference, held in Paris, and later overseen by officials at the Paris Observatory.⁸³ Twenty-one separate international observatories participated in an effort to map and later measure the brightness of some three million known stars. The project took far longer than initially imagined but eventually resulted in the publication of an astrographic catalogue in 1964. However, the venture helped unite international astronomical efforts, and, more importantly, it standardized photographic techniques for the discipline. Also of note was the *Atlas photographique de la lune*, first published in 1900.⁸⁴ Between 1894 and 1900 Moritz Loewy and Pierre-Henri Puiseux, also of the Paris Observatory, produced hundreds of images of the moon's surface. The resulting atlas included eighty heliographs culled from their observations. It remained a primary visual resource on the moon's topography until it was superseded by images captured by the Lunar Orbiter in the 1960s.

Most historians of photography agree that by the late 1880s photography's applications in astronomy began to exceed the former limitations of traditional

⁸³ See Lankford, "The Impact of Photography on Astronomy," 29-32; and Gérard de Vaucouleurs, *Astronomical Photography: From the Daguerreotype to the Electron Camera*, trans. R. Wright (New York: Macmillan, 1961), 32-38 and 50-51. Historian Charlotte Bigg has also provided a fascinating account of the role of female labor in the Carte du Ciel efforts. See Charlotte Bigg, "Photography and the Labour History of Astrometry: The Carte du Ciel," in *The Role of Visual Representation in Astronomy*, ed. Klaus Hentschel and Axel Wittmann (Thun: Verlag Harri Deutsch, 2000), 90-106.

⁸⁴ For a brief description of this lunar cartography project and the works of scientists Loewy and Puiseux, see Ronald Greeley and Raymond M. Batson, ed., *Planetary Mapping* (New York: Cambridge University Press, 1990), 23.

observation; as a result astronomers increasingly accepted the technology as a valid aid in astronomical research and investigation.⁸⁵ The advent of the field of astrophysics also played a role in the gradual acceptance of photography as a beneficial tool in astronomy. Photography, as utilized by the still young sub-discipline, was no longer merely an added aid in observation and instead became a necessary tool for discovery. It allowed scientists to document otherwise unrecordable phenomena regarding the physical composition of stars.⁸⁶

The application of photography to astronomy during the late nineteenth and early twentieth centuries yielded huge depositories of images, which chronicled contemporary study and inquiry, but which might also be used for future research. And, while the scientific benefits of such images was apparent, observatories and astronomical societies also realized the potential boon to public awareness inherent in the dissemination of such images. Scholar Jennifer Tucker has tracked such efforts by Britain's RAS, or Royal Astronomical Society; the group began selling images around 1892 for commercial reproduction and public use.⁸⁷ By the end of the nineteenth century, astronomical photographs were seen by a growing public audience, sometimes in commercial venues, such as advertisements, which were not conventionally associated with astronomy or scientific discourse. These same images were also increasingly shown in public scientific

⁸⁵ Lankford, "The Impact of Photography on Astronomy," 16; and Vaucoleurs, *Astronomical Photography*, 55.

⁸⁶ Lankford, "The Impact of Photography on Astronomy," 25. For a lengthier discussion of the early application of photography to astrophysics, see Alex Soojung-Kim Pang, *Empire and the Sun: Victorian Solar Eclipse Expeditions* (Stanford, CA: Stanford University Press, 2002), 121-129.

⁸⁷ Tucker, *Nature Exposed*, 202-207.

venues, including displays at World's Fairs and other international exhibition venues. Both the 1850 and 1867 Paris Expositions Universelles featured highly attended photographic displays that included applications of the technology in the astronomical field.⁸⁸ By the early decades of the twentieth century, science and natural history museums began to incorporate astronomical photographs in their displays. As such, these images were no longer solely of use as aids in scientific discovery; instead, these same images encouraged public enthusiasm and understanding of the field.

Still photographs helped build popular interest in astronomy in the later nineteenth century and continued to captivate popular audiences at the beginning of the twentieth century. One further visual technology that contributed to the popularization of astronomy during the mid-twentieth century was the development of planetaria. First developed in 1923, by the end of the 1930s many major urban centers—including Paris—would feature such sites as a means to educate the public on the wonders of the cosmos.

The idea of a planetarium or a means to represent the universe was not a new one at the outset of the twentieth century. Man had made numerous attempts to model his understanding of the universe in a three-dimensional medium using celestial globes, orreries, and astronomical clocks.⁸⁹ But, it was not until 1923 that a team of technicians working at the Carl Zeiss optical firm in Jena, Germany, in conjunction with Munich's

⁸⁸ Carolyn Peter, "Expositions Universelle, Paris (1854, 1855, 1867, etc.)," in *Encyclopedia of Nineteenth-Century Photography, Volume 1* (New York: Routledge, 2008), 512-514.

⁸⁹ For a history of such devices, see Henry C. King, *Gearred to the Stars: The Evolution of Planetariums, Orreries and Astronomical Clocks*, (Toronto: The University of Toronto Press, 1978).

Deutsches Museum, were able to first unite these astronomical models with contemporary projection technology in a small domed space.⁹⁰ The planetarium at the Deutsches Museum opened the following August, and widespread praise in the media followed. The device was recognized as both a remarkable pedagogical aid and a highly entertaining scientific spectacle.

Over the succeeding two decades, museum and educational institutions in major cities across Europe and America would gradually acquire the projection equipment necessary to support their own planetaria.⁹¹ Notably, however, Paris's first planetarium did not open until 1937, in conjunction with the Exposition Internationale des Arts et Techniques dans la Vie Moderne. Even though many Surrealists would not have had access to a planetarium until this late date in the period under study, interested artists—as

⁹⁰ The Deutsches Museum was founded in 1906 by Oskar Von Miller. He served as director until his death in 1934. Miller wanted to provide a more interactive museum environment. He initially met with Zeiss technicians—already known for their production of a full range of optical and astronomical devices—to discuss production of a Copernican model of the universe that would fill a whole room at the museum. Technicians suggested that the project shift from a mechanical, physical model, to one based on optical projection. After many years dealing with problems related to both the instrumentation and the projection equipment, Zeiss employees hosted the first use of a planetarium projector on the roof of their factory in a specially built concrete domed shell. Within two years of the August 1924 opening at the Deutsches Museum, the planetarium welcomed between 80,000 and 100,00 visitors. For more on the history of the Deutsches Museum, see Wolf Peter Fehlhammer and Wilhelm Fuessl, “The Deutsches Museum: Idea, Realization, and Objectives,” *Technology and Culture* 41 (July 2000): 517-520; and Otto Mayr, *The Deutsches Museum: German Museum of Masterworks of Science and Technology, Munich* (London: Scala Books, 1990). The history of the planetarium has been written about extensively by Jordan D. Marché. While Marché's text primarily focuses on the American adoption of these technologies and the public response to such displays, he also provides a history of the development of planetaria in Germany and Europe. Marché's text also provided an excellent model for this dissertation's focus on popular interest in astronomy. See Jordan D. Marché, *Theaters of Time and Space: American Planetaria, 1930-1970*. (New Brunswick, NJ: Rutgers University Press, 2005).

⁹¹ By 1930, there were fifteen planetaria in Europe (most concentrated in Germany with additional sites at Vienna, Rome and Moscow). Chicago's Adler Planetarium opened in 1930, marking the introduction of the technology to the United States; between 1930 and 1939 six other sites were constructed in Philadelphia, Los Angeles, New York, San Jose, Pittsburgh, and Springfield, Massachusetts.

will be discussed at length in Chapter Two—likely visited the displays at the nearby Palais de la Découverte in 1937 and would have had the opportunity to see the projection displays at the planetarium. Despite this limited access in Paris, planetaria added an almost cinematic quality to the public enjoyment of astronomy. At the same time programming was rooted in astronomical science. This technology, coupled with the more far reaching effect of astronomical photographs, encouraged popular curiosity and inspired lay viewers to learn more about the heavens. More importantly, these visual documents of the cosmos captured the wonders of telescopic vision for the public and made manifest the work of astronomers and astronomical phenomena previously unseen by the unaided human eye.

IMAGINING THE COSMOS: SCIENCE FICTION AS ASTRONOMICAL POPULARIZER

For the Surrealists, the work of science fiction writers may have had the greatest appeal in terms of ready access to information on astronomical phenomena. Science fiction in its many formats—film, literature, comics, etc.—sought to explain the unexplainable or at the very least to posit fantastic means to explore the unknown. Outer space served as a primary landscape for these imagined quests and voyages, allowing humans, if only temporarily, to explore worlds and planetary vistas beyond Earth. While the science of science fiction often moved beyond the possible or even plausible, many writers drew inspiration from the latest findings in the discipline. Science fiction was primarily an amusement, but most readers were also able to see past the common tropes

of the genre and gain access to some basic understanding of the relevant scientific theories or ideas. As the early twentieth-century American science fiction publisher Hugo Gernsback argued in 1920, “Not only is science fiction an idea of tremendous import but it is to be an important factor in making the world a better place to live in, through educating the public to the possibilities of science and the influence of science on life.”⁹² As Gernsback recognized, the genre often inspired readers to seek further answers and could serve as an initial point of access to scientific discourse.

The Surrealist interest in science fiction, comic books, and other pulp publications is well established. A number of Surrealists authors and artists were avid readers of popular crime fiction and other pulp serials.⁹³ Moreover, any list of surrealist literary predecessors would be incomplete without mention of science fiction greats such as H. G. Wells and Jules Verne.⁹⁴ In the realm of science fiction and film, Surrealist filmmakers—not to mention artists and authors—looked to the work of George Méliès as an important precursor to their own projects. In part it was Surrealist filmmaker René Clair who was responsible for renewed interest in the work of Méliès. Clair organized

⁹² Edward James, *Science Fiction in the Twentieth Century* (New York: Oxford University Press, 1994), 8.

⁹³ See Jonathan P. Eburne, *Surrealism and the Art of Crime* (Ithaca, NY: Cornell University Press, 2008); Mona Hadler, “David Hare, Surrealism, and the Comics,” *The Space Between* 7 (2011): 93-108; and Robin Walz, *Pulp Surrealism: Insolent Popular Culture in Early Twentieth-Century Paris* (Berkeley: University of California Press, 2000).

⁹⁴ Breton and others among the Surrealists were great admirers of French playwright Raymond Roussel, whose admiration and adaptation of the fantastic tales of Verne has been well established. For a discussion of both Roussel’s ties to Verne—particularly in his *Impressions d’Afrique* from 1909—and the Surrealist ties to Roussel, see João Fernandes, et al., *Impressions of Raymond Roussel: Locus Solus* (Madrid: Turner, 2011); and Terry Hale and Andrew Hugill, “The Science is Fiction: Jules Verne, Raymond Roussel and Surrealism,” in *Jules Verne: Narratives of Modernity* ed. Edmund Smyth (Liverpool: Liverpool University Press, 2000), 78-93.

one of the earliest film tributes to the legend in 1930, which certainly would have been attended by fellow Surrealists.⁹⁵ In 1936, Alfred H. Barr, curator at New York's Museum of Modern Art, exploited the connection between Surrealism and Méliès for his exhibition *Fantastic Art, Dada, Surrealism*. He showed the French filmmaker's best known projects—including *Le Voyage à la Lune* [*A Trip to the Moon*—in a film series designed to accompany the exhibition, which served as the major American introduction to the Surrealist movement.⁹⁶ The Surrealists again proclaimed their admiration for Méliès's films in a 1951 issue of *L'Âge du cinéma*, where he was listed as one of several recommended directors.⁹⁷

More importantly, however, science fiction and Surrealism were founded on similar premises. Both attributed their genesis to the work of scientists, with Surrealism's roots in Freudian psychology and science fiction's various disciplinary origins. This scientific pedigree then became fodder for fantastic imaginings often explained as a means either to explore or tap into some unknown, whether it be existence beyond our own planet or the unconscious mind.

⁹⁵ Madeleine Malthête-Méliès, *Méliès L'Enchanteur*, (Paris: Hachette Littérature, 1973), 407 and 432. Malthête-Méliès specifically mentions Breton, Paul Eluard, and Louis Aragon among those Surrealists who most respected Méliès' films. Surrealist film scholar Michael Richardson also discusses the connections between the Surrealists and Méliès. Despite carelessly dismissing a connection between science fiction and Surrealism, he astutely highlights the way in which Méliès' films evoke the Surrealist conception of the marvelous. See Michael Richardson, *Surrealism and Cinema* (New York: Berg, 2006), 15-26.

⁹⁶ Alfred H. Barr, Jr., ed., *Fantastic Art, Dada, Surrealism* (New York: Simon and Schuster, 1936), 262.

⁹⁷ Gérard Durozoi, *History of the Surrealist Movement*, trans. Alison Anderson (Chicago: The University of Chicago Press, 2002), 520. The August-November issue (number 4-5) of *L'Âge du cinéma* was designated as a special issue on surrealism and "The Age of Surrealist Cinema."

In histories of science fiction in France, most scholars identify the sixteenth-century author Rabelais as one of the progenitors of the *voyage imaginaire* [imaginary journey].⁹⁸ In his texts *Pantagruel* (1532) and *Gargantua* (1534) the author used fantastic quests as an allegory for contemporary political and religious concerns, even making mention of a trip to the moon. While Rabelais explored the idea of the journey in various modes, beginning in the mid-seventeenth-century authors began to define and establish sub-genres or themes within this greater category. One such type was the cosmic journey in which characters explored the imagined terrains of known planetary bodies—the sun, moon, and surrounding planets—as well as other previously unknown worlds. Most notably, Cyrano de Bergerac, in his collection of stories *L'Autre Monde* (1662), and the aforementioned Fontenelle devised methods of space travel and speculated on forms of life on other planets in their texts. The cosmic voyage remained common in French fiction until the dawn of the French Revolution when interest waned.

By the mid-nineteenth century, space exploration began to gain ground yet again as an important science fiction sub-genre. In France, such efforts were best seen in the texts of Flammarion, who melded the latest findings in cosmology with speculation on alien life forms, as well as the lesser known figure C. I. Defontenay. In his *Star, ou Psi de Cassiopée* (1854), Defontenay, a medical doctor by training, detailed a meticulous

⁹⁸ Arthur B. Evans, “Science Fiction in France: A Brief History,” *Science Fiction Studies* 16 (November 1989): 254; and Jean-Marc Lofficier and Randy Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction: A Guide to Cinema, Television, Radio, Animation, Comic Books and Literature from the Middle Ages to the Present* (Jefferson, NC: McFarland & Company, Inc., 2000), 302.

history of a civilization on the distant planet Star.⁹⁹ He devoted long passages to a taxonomic accounting of flora, fauna, and alien races as well as speculation on anti-gravity powered space craft. Both authors aimed at believability in their texts. They made a more concerted effort at better incorporating the latest scientific findings and technological know-how than their literary predecessors.¹⁰⁰ Despite the contributions of Flammarion and Defontenay, however, it was Jules Verne who would revolutionize French science fiction, helping to usher in the so-called “Golden Age.”¹⁰¹

Verne’s texts were always scientifically plausible and well-researched, yet also highly engaging. He wrote primarily for a youth audience and had a keen awareness of how to engage and inspire this fan base. Despite writing for children, Verne was careful never to oversimplify his texts. He never assumed that scientific content was a detractor and privileged the scientific character of his tales. In texts such as *From the Earth to the Moon* (1865), *Around the Moon* (1870), *Topsy Turvy* (1889), and *Chase of the Golden Meteor* (1908), he balances the thrill of adventure and concocted schemes for space travel with the documentary nature of scientific research. The stuff of contemporary science was always voiced and explained by the character of a scientist, who backed up his assertions and inventions with meticulous logs, letters, or references to contemporary

⁹⁹ C. I. Fontenay, *Star: Psi Cassiopeia*, trans. P. J. Sokolowski (Boston: Gregg Press, 1976).

¹⁰⁰ Lofficier and Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction*, 334.

¹⁰¹ Evans, “Science Fiction in France: A Brief History,” 256; and Lofficier and Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction*, 337-339. For an additional history of French science fiction prior to Verne, see J. M. Gouanvic, D. Suvin, and Marc Angenot, “Science Fiction in France before Verne,” *Science Fiction Studies* 5 (March 1978): 71-81.

news headlines. At times, Verne went so far as to directly quote scientists and other popularizers.¹⁰² His stories privilege scientific discovery and innovation as the true adventure worth pursuing. In the images that complemented his text, Verne also insisted that depictions of space travel and other astronomical content be highly accurate, providing illustrators with reference materials and also requiring checks for authenticity.¹⁰³ Verne, while certainly a great entertainer, understood the scientific value of his texts and recognized the way in which his fantastic tales might serve to stimulate public scientific knowledge.

In the wake of Verne's prodigious success, a whole school of authors, utilizing similar narratives and approaches to those that had brought Verne fame, found a readership.¹⁰⁴ Like Verne, these authors explored a whole range of science fiction sub-genres. Among the most successful in the realm of cosmic journeys and space exploration were André Laurie, Georges Le Faure, Henry de Graffigny, Henri Gayar, and

¹⁰² Arthur B. Evans, *Jules Verne Rediscovered: Didacticism and the Scientific Novel* (New York: Greenwood Press, 1988), 142. In another article Evans makes a distinction between Verne's approach to science and that of his later successors. He argues that Verne's text should be termed "scientific fiction" and not science fiction because of the pedagogical nature of Verne's text and his insistence on using his stories as a means to disseminate knowledge on scientific topics that was more or less factually accurate. For a lengthier discussion of this distinction and Verne's scientific tactics, see Arthur B. Evans, "Science Fiction vs. Scientific Fiction in France: From Jules Verne to J.-H. Rosny Aîné," *Science Fiction Studies* 15 (March 1988): 1-11.

¹⁰³ Ron Miller, "The Archaeology of Space Art," *Leonardo* 29 (1996): 141.

¹⁰⁴ For more on Verne's science fiction successors in France, see Arthur B. Evans, "The Verne School in France: Paul d'Ivoi's Voyages Excentriques," *Science Fiction Studies* 36 (July 2009): 217-234.

J.-H. Rosny Aîné. Rosny was especially inventive, excelling at tales of alien threats and encounters as well as cosmic discovery.¹⁰⁵

Verne's success also prompted the creation of illustrated science fiction magazines. Originally formed to reprint Verne's stories in serial format, *Voyages extraordinaires* soon expanded its purview to include the works of other popular authors. Despite its dissolution in 1910, other pulp magazines formed to reach out to a quickly growing audience of enthusiastic readers. These included publications such as *Romans d'aventures* (1884-1905) and *Voyages scientifiques extraordinaires* (1892-94) as well as the highly successful magazines *Le Journal des voyages* (1875-1949) and *L'Intrepide* (1910-1937). Flammarion even offered his own pulp publication, *Les Grande Aventures*, from 1888 to 1900. All of these magazines provided even greater popular access to science fiction, reprinting works by both French and international science fiction writers. Moreover, these formats also included early examples of the comic genre in France, and longer-running titles such as *L'Intrepide* were sold in the years after World War II and reimagined as comic-based publications. For Breton and other early members of the Surrealist movement—many of whom were born in the late 1880s and 1890s—these titles were likely the treasured reading materials of their childhood, perhaps in some way rousing their later imaginative literary and artistic output. Breton biographer Mark

¹⁰⁵ For more on Rosny's contributions to French science fiction, see Stableford's introduction in J.-H. Rosny Aîné, *The Scientific Romances of J.-H. Rosny Aîné: The Navigators of Space and Other Alien Encounters*. trans. Brian Stableford (Encino, CA: Black Coat Press, 2010). Some historians of science fiction even recognize Rosny, and not Verne, as the father of modern French science fiction. See Evans, "Science Fiction in France," 258.

Polizzotti has noted that Breton voraciously read pulp adventure stories and illustrated texts as a boy.¹⁰⁶

During this same time period, the French public would have been exposed to science fiction tales of cosmic exploration and discovery in the comics, or *bandes dessinées* [illustrated strips]. Often considered an American art form, comics originated with “picture stories” or heavily illustrated publications for children that appeared first in Switzerland around 1827 and then in France in the later nineteenth century.¹⁰⁷ The early success of French illustrated books by authors such as Christophe (pseudonym of Marie Louis Georges Colomb) and Albert Robida led to the development of illustrated periodicals of a type wholly different from the science fiction and adventure magazines previously mentioned. Cheaply printed and often quite short in length, titles such as *Le Petit Journal illustrée*, *L'Épatant*, and *Les Pieds nickelés* appeared on shelves in the years leading up to World War I.

During these years, the types of stories included in such comics rarely addressed themes common in science fiction literature. The one exception was the serialized *Dans la planète Mars*, which appeared in eleven weekly installments in *Belles Images* from January to March 1915. Signed with the simple signature G. Ri., this was the work of

¹⁰⁶ Mark Polizzotti, *Revolution of the Mind: The Life of André Breton*, revised edition (Boston: Black Widow Press, 2009), 9.

¹⁰⁷ Reinhold Reitberger and Wolfgang Fuchs, *Comics: Anatomy of a Mass Medium* (Boston: Little, Brown and Company, 1971), 174; and Lofficier and Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction*, 132. Swiss writer Rodolphe Topffer’s first graphic story, *The Story of M. Vieuxbois* appeared in 1827. The earliest French examples were available as early as 1887 and also targeted a youth audience.

artist Victor Mousselet.¹⁰⁸ The comic appeared early in each edition and usually spanned two pages with approximately twenty-four image panels per installment. In the story, three humans visited the planet Mars: a wise, older man named Polycarpe, a younger woman named Brigitte, and a younger, high-spirited man named Nigodot. While it is not entirely clear how the three arrived on Mars, in each issue the three characters learned about Martian society and culture.¹⁰⁹ The Mars of the story was a fantastic world populated by winged, fairy-like creatures. Their cities were filled with huge iron towers—similar to the Eiffel tower—and Martian citizens, despite their wings, traveled about in fantastic automobiles, helicopters, and blimps. The series also featured a plot by an unknown, masked Martian to destroy the scientific discoveries of the Martian who hosted the three human guests. The story concluded with the double wedding of Brigitte and Polycarpe to two Martian suitors. In the final panel of the comic strip, the reader was informed that the story was transmitted via a radiogram sent from Mars to *Belle Images*.

In the years after World War I, the comics industry in France struggled to rebuild after suffering major economic setbacks during the war years. Some of the illustrated magazines that had flourished prior to the war had disappeared and still others found it necessary to reestablish their readership after suffering interruptions in publishing. By the later 1930s there was again increased interest in the comic genre in France. But, there

¹⁰⁸ Lofficier and Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction*, 132.

¹⁰⁹ Issue 2 included an imaginative view of biomedical engineering and evolutionary development. Visiting a science museum, the humans learn that the Martians had discovered how to replace body parts to suit one's occupation; an opera singer sported a huge mouth—better for singing it seemed—while a perfumier had been equipped with a massive nose. Several issues also highlighted Martian social structures; in issue one Brigitte was introduced to the life of Martian women, a life filled with housework and child-rearing not all that different from a woman's expected role on Earth.

were still very few examples of French-produced comics that featured topics of astronomical interest. One exception was a serial entitled *Les Aventurier du Ciel: Voyages extraordinaires d'un petit Parisien dans la stratosphere, la lune, et les planetes* authored by R. M. de Nizerolles.¹¹⁰ The main character was a young boy named Tintin—no relation to Belgian cartoonist Hergé's series of the same name.

In issue one, Tintin visited the Paris Observatory where he encountered a rocket ship. A mishap occurs and the rocket is accidentally launched into space with Tintin, a young reporter and a German secret agent aboard. In subsequent issues, the passengers aboard the rocket explored strange planets and encountered a variety of alien races. The comic freely mixed sub-genres of fantasy and science fiction. Part adventure tale, part science fiction, the story borrowed from the late nineteenth-century plurality of worlds debate. For example, the Martian inhabitants lived on a planet with a complex system of canals—perhaps a reference to the Martian canals debate.

Although comics saw their greatest popularity in France in the decades after World War II, they were another popular, widely accessible, and cheaply acquired mode for the transmission of cosmic fantasy and science fiction in the first several decades of the twentieth century. While many of these publications primarily targeted a youth readership, they still included imagery and details that evoked contemporary trends and ideas in science. And certainly the bizarre interplanetary journeys described within their

¹¹⁰ One hundred and eight total issues were published between 1935 and 1937. New releases appeared each Thursday at a cost of thirty-five centimes.

pages could have served as an impetus for a reader to learn more about astronomy and the cosmos in less fantastic, more scientific sources.

In addition to its literary and comic forms, science fiction was also accessible to the public at the cinema. Science fiction film almost certainly had its genesis in France with the movies of Georges Méliès, whose importance for Surrealism was noted above.¹¹¹ Between 1896 and 1912, Méliès produced some 500 films. Many of these movies, including his celebrated *Le Voyage dans la Lune* from 1902, dealt with astronomical themes, imaginatively presenting space travel, alien life forms, and other planetary world. For Méliès, as later twentieth-century experimental filmmaker Stan Brakhage has noted, film could serve as “the gateway for an alien world underneath the surface of our natural visual ability.”¹¹²

Of the 500 films Méliès produced, only a few directly addressed astronomical concerns. These include: *La Lune à un mètre / L’Homme dans la Lune* [The Astronomer’s Dream, or the Man in the Moon] from 1898, *Le Voyage dans la Lune* [A Trip to the Moon] from 1902, and *Le Voyage à travers l’Impossible* [An Impossible Voyage] from 1904. Yet, these films—especially *Le Voyage dans la Lune*—were and remain his most popular contributions in the history of cinema.¹¹³

¹¹¹ For more on Méliès’ biography and his career as a filmmaker, see Elizabeth Ezra, *Georges Méliès: The Birth of an Auteur* (New York: St. Martin’s Press, 2000); Paul Hammond, *Marvelous Méliès* (London: The Gordon Fraser Gallery, Ltd., 1974); and Malthête-Méliès, *Méliès l’enchanteur*.

¹¹² Stan Brakhage, *The Brakhage Lectures: George Méliès, David Wark Griffith, Carl Theodore Dreyer, Sergei Eisenstein* (Chicago: The Good Lion, 1972), 20.

¹¹³ In part, the success and notoriety of these three films must also be attributed to the fact that they are three of the only ninety films produced by the filmmaker that still survive. In 1917, just prior to the end of

In these films, Méliès managed to symbolically represent the attraction many people, including the filmmaker, felt to astronomy. In Méliès' fantastic world, explorers set out to understand the unknown reaches of space and valiantly overcame all obstacles. While the scientific accuracy and plausibility of these tales was questionable, Méliès often filled his backdrops and stage sets with the paraphernalia of scientific discovery—telescopes, chalkboards covered in diagrammatic calculations, and whirring, motorized machines. Méliès reveled in clichés; his scientists were wizened, mad-cap, geniuses obsessed with their work but also action heroes willing to take any risk in the name of discovery. Perhaps most importantly, the filmmaker personified astronomy as a beautiful, unobtainable woman—the Moon Goddess in *La Lune à un mètre* or the stars that transform into alluring gamines in *La Voyage dans la Lune*—whom the male scientist hero cannot help but stare at in wonder. Via this allegorical representation, Méliès emphasized the sense of wonderment felt by those who stare up at the heavens.

In the years following Méliès' great success, the history of French-produced science fiction cinema verged more toward the terrain of the fantasy and horror genres. Few films made after the 1910s addressed space travel and/or alien encounters.¹¹⁴ One of the exceptions to this lack of space-related motion pictures was the 1930 film *La Fin du*

World War I, Méliès lost the lease on his theatre, located at the Passage de l'Opera. The military requisitioned all films from the site to be melted down for their celluloid content, using the materials to produce boot heels. In 1923, the filmmaker also lost controlling interest in his film company, Star Films, and his film studio in Montreuil. Following this setback, Méliès was furious over the fact that he might lose control over his creative property, and he burned the negatives for a number of his films. See Hammond, *Marvelous Méliès*, 8 and 81.

¹¹⁴ Lofficier and Lofficier, *French Science Fiction, Fantasy, Horror and Pulp Fiction*, 14.

Monde, director Abel Gance's cinematic translation of Flammarion's 1893 book of the same name.¹¹⁵ Gance's adaptation demonstrated a continued appreciation for Flammarion's work well after his death. Still, it was a film rarity in terms of its exploration of astronomical themes.

In the years prior to World War II, science fiction in film and print media would have certainly served as yet another accessible venue for building popular interest in outer space. The Surrealist predilection for pulp literature, early science fiction, and Méliès' films stands as further proof of the far-reaching effects of such cultural production.

DIVINING THE COSMOS: THE FRENCH OCCULT REVIVAL, ASTROLOGY, AND THE TAROT AS POPULARIZER

Surrealism's Engagement with the Occult

In their art and writing, the Surrealists drew freely from occult sources. They saw in the occult yet another means to access the unconscious mind and create via automatic processes. Moreover, their reliance on such sources highlighted the continued prominence of such practices and knowledge within twentieth-century French popular

¹¹⁵ *La Fin du Monde* would be one of Gance's last successful films and his first to incorporate sound. A celebrated and inventive director in the silent era, Gance first conceived *La Fin du Monde* as a silent film, but in the wake of the talkie revolution in cinema he struggled to quickly incorporate sound into the largely finished film. Gance struggled with this new mode in filmmaking and the advent of sound in film marked the end of his career. See Rémi Fournier Lanzoni, *French Cinema: From Its Beginnings to the Present* (New York: The Continuum International Publishing Group, Inc., 2005), 49-57. Gance was also included in Surrealist lists of cinema greats and was included in a list of "official representatives of avant-garde cinema" that appeared in the same special issue on Surrealist cinema of *L'Âge du cinéma* that had also named Méliès as a favored filmmaker. See note 99 above and Durozoi, *History of the Surrealist Movement*, 520.

culture. During the late nineteenth and early twentieth centuries, France experienced a resurgence of interest in the occult. With its beginnings in the pre-revolutionary ferment of the mid-eighteenth century and continuing in the nineteenth-century efforts of key figures such as Éliphas Lévi and Papus, occultism in France offered an alternative means to understand the physical, psychical, and spiritual realms. In these varied traditions, divinatory practices linked to astronomical observation, such as astrology and the Tarot, were a common concern of occult theorists and practitioners. As a result, those who either studied or were aware of occult traditions and beliefs, in their various forms, often gained an understanding and appreciation of astronomical phenomena via their encounters with such practices and ideologies.

The term occult is decidedly ambiguous and difficult to define.¹¹⁶ In the nineteenth century, it might have referred to a whole array of diverse systems of belief and related activities including divination, sorcery or magic, and spiritualist concerns. Moreover, these complex traditions incorporated—oftentimes indiscriminately—esoteric knowledge from both ancient sources and more recent scholarship. However, as historian

¹¹⁶ Roger Galbreath's definition from "A Glossary of Spiritual and Related Terms" reveals the inherent difficulties in coming up with a singular, satisfactory definition for the term "occult." He specifically notes the interchangeable use of the term to designate a diverse set of ideas from the psychical to the magical. Galbreath argues that the term, most simply defined, connotes a basis in hidden or secret knowledge and practices. Also of use is Galbreath's differentiation between the "occult" (a broad, umbrella term, as described) and "occult sciences," a term he uses specifically to describe a range of actual occult practices—he lists astrology, alchemy, and magic. Galbreath's definition of the occult implies that spiritualism falls within this broader category. However, he also provides a separate definition for spiritualism, which concerns varied attempts at spirit communication, such as mediumship, hypnosis and other trance states, and séances. See Roger Galbreath, "A Glossary of Spiritual and Related Terms," in *The Spiritual in Art: Abstract Painting 1890-1985*, ed. Maurice Tuchman (New York: Abbeville Press, 1986), 380-381 and 384-385.

Alex Owen has argued, what united all these concerns and practices was the “implicit acceptance of the idea that reality as we are taught to understand it accounts for only a fraction of the ultimate reality which lies just beyond our immediate senses.”¹¹⁷ Thus, occultism, in its most basic sense, described any practice that might help explain occluded phenomena, or those occurrences outside our known reality.

As previously mentioned in the discussion of scientific photography, this idea of the unknown was also a prominent theme of late nineteenth- and early twentieth-century science. New discoveries in atomic theory and the confirmation of subatomic particles, late nineteenth-century ether physics, telegraphy and wireless communication, and the identification of various ranges of the electromagnetic spectrum, among many other discoveries of the era, all suggested that the world consisted of much beyond the visible range of human vision. Moreover, the disciplinary boundaries between scientific pursuits and occultism were quite thin. A number of noted scientists participated in occult pursuits including such luminaries as Oliver Lodge, William Crookes, Charles Richet, and Camille Flammarion.¹¹⁸

¹¹⁷ Alex Owen, *The Place of Enchantment: British Occultism and the Culture of the Modern* (Chicago: The University of Chicago Press, 2004), 19. Owens’ text focuses solely on the occult tradition in Britain; as such, her text is useful in this definitional context but provides little additional information on the development of occultism in France. This is not to say that occultism in Britain was entirely removed from developments in France, and these histories certainly overlap at times.

¹¹⁸ In addition to their work in physics and chemistry, Lodge and Crookes were both involved in the contemporary study of psychical phenomena and the field known as either parapsychology or psychical research. Linda Dalrymple Henderson has discussed Crookes and Lodge in her research on modern artists and the ether. See Linda Dalrymple Henderson, “Vibratory Modernism: Boccioni, Kupka, and the Ether of Space,” in *From Energy to Information: Representation in Science and Technology, Art, and Literature*, ed. Bruce Clarke and Linda Dalrymple Henderson (Stanford, CA: Stanford University Press, 2002), 126-149. For more on the connections between British scientists and occult or psychical research, see W. H. Brock, *William Crookes and the Commercialization of Science* (Burlington, VT: Ashgate Press, 2008); Sherrie

These scientists approached their studies in keeping with the dominant positivist philosophies of the same period. Accordingly, any sensory data, even if it might be derived from an extra-sensory experience such as a séance, hypnosis, or other spiritualist practice, could be seen as a possible confirmation of scientific truth, or at the very least of phenomena worthy of further study. This was very much the case for early psychological researchers. As a scientific discipline, psychology was a fledgling field in the late-nineteenth century. Moreover, the topic of study, the mind, was an unseen or immaterial subject, and researchers were tasked with creating observational modes for understandings the inner workings of the human psyche. Leading French psychologists of the period such as Jean-Martin Charcot, Pierre Janet, Théodore Flournoy, and Richet

Lynne Lyons, *Species, Serpents, Spirits and Skulls: Science at the Margins in the Victorian Age* (Albany: State University of New York Press, 2009), 87-109; Janet Oppenheim, *The Other World: Spiritualism and Psychical Research in England, 1850-1914* (Cambridge: Cambridge University Press, 1985); and David B. Wilson, "The Thought of Late Victorian Physicists: Oliver Lodge's Ethereal Body," *Victorian Studies* 15 (September 1971): 29-48. In his *Concerning the Spiritual in Art*, Wassily Kandinsky mentions the interest of scientists, including Richet and Flammarion, in psychical research. See Wassily Kandinsky, *Concerning the Spiritual in Art*, trans. M.T.H. Sadler (New York: Dover Publications, 1977), 13. Sofie LaChapelle provides an excellent history of late nineteenth-century French psychology and psychical research. See Sofie LaChapelle, *Investigating the Supernatural: From Spiritism and Occultism to Psychical Research and Metaphysics in France, 1853-1931* (Baltimore: The Johns Hopkins University Press, 2011). For a discussion of Flammarion's links to psychical research, see Chaperon, *Camille Flammarion: Entre astronomie et littérature*, 164; Robert Crossley, "Mars and the Paranormal," *Science Fiction Studies* 35 (November 2008): 466-484; and Camille Flammarion, "Spiritualism and Materialism: A Reply to Camille Saint-Saëns," in *Haunted Houses*, trans. E. E. Fournier d'Albe (New York: Appleton, 1924), 1-19. For more on Richet's psychical research, see Charles Richet, *Traité de métaphysique* (Paris: Félix Alcan, 1922). A number of recent publications explore the intersections of late nineteenth-century science and the occult, in France as well as in England and the United States. See Peter J. Bowler and Iwan Rhys Morus, *Making Modern Science: A Historical Survey* (Chicago: The University of Chicago Press, 2005), 384-388; M. Brady Brower, *Unruly Spirits: The Science of Psychic Phenomena in Modern France* (Urbana: The University of Illinois Press, 2010); Danny Ethus Burton and David A. Grandy, *Magic, Mystery, and Science: The Occult in Western Civilization* (Bloomington: Indiana University Press, 2003), 183-207; Jill Galvan, *The Sympathetic Medium: Feminine Channeling, the Occult, and Communication Technologies, 1859-1919* (Ithaca, NY: Cornell University Press, 2010); Tatiana Kontou and Sarah Willburn, ed., *Ashgate Research Companion to Nineteenth-Century Spiritualism and the Occult* (Burlington, VT: Ashgate Press, 2012), 19-122; and John Warne Monroe, *Laboratories of Faith: Mesmerism, Spiritism, and Occultism in Modern France* (Ithaca, NY: Cornell University Press, 2008).

all looked to occult and spiritualist practices as a means to confirm their research on the subconscious as well as various psychological maladies and conditions.¹¹⁹

While individual Surrealists may or may not have been interested in using the occult and Spiritualism as a source for their creative endeavors, the occult did play a role in the group's early formation and provided early experimental mechanisms for automatic practice.¹²⁰ Many Surrealists would have encountered occult practices in their initial exploration of the unconscious and associated developments in psychology. In his training as a medical student prior to World War I and his subsequent work in field hospitals and army psychiatric facilities, Breton gained exposure to late nineteenth- and early twentieth-century work in psychology. Beyond the writings of Freud, much of Breton's medical and psychological knowledge would have come from the work of the above-mentioned French psychologists.¹²¹ Scholar Jennifer Gibson has argued that it was the dynamic psychiatry practiced by Janet and Charcot rather than Freud's theories on the

¹¹⁹ The aforementioned scholarship of Sofie LaChapelle provides an excellent account of the work of these three men and other key figures in late nineteenth-century French psychology. See also Jacqueline Carroy and Régine Plas, "The Origin of French Experimental Psychology: Experiment and Experimentation," *History of the Human Sciences* 9 (1996): 73-84; and Henri F. Ellenberger, *The Discovery of the Unconscious: The History and Evolution of Dynamic Psychiatry* (New York: Basic Books, 1970).

¹²⁰ As mentioned in the introduction, there are a number of useful works on the relationship between individual Surrealist artists and various occult practices. Here, I intend only to briefly address the very basic links between occult phenomena and the foundations of Surrealist artistic and literary practice. Individual interest in the occult, especially astrology and the Tarot, will be discussed further in Chapter 5.

¹²¹ For a discussion of these psychologists as their work applies to Surrealism, see Jennifer Gibson, "Surrealism Before Freud: Dynamic Psychiatry's 'Simple Recording Instrument,'" *Art Journal* 46 (Spring 1987): 56-60. In his lengthier discussion of Surrealism and psychoanalysis, David Lomas also discusses these issues. See David Lomas, *The Haunted Self: Surrealism, Psychoanalysis, Subjectivity* (New Haven, CT: Yale University Press, 2000).

unconscious that served as the primary source for the automatic practices that the Surrealists encouraged from the beginning of the movement.¹²²

In the 1920s, the Surrealists began designing experimental modes to access the unconscious mind. In addition to tactics such as automatic drawing and the word and image play of the “Exquisite Corpse” parlor games, they also drew upon their knowledge of both psychology and the occult. Breton described one experiment of this type in his essay “The Medium Enters,” first published as “Entrée des mediums” in *Littérature* in 1922.¹²³ According to Breton, René Crevel first introduced the Surrealists to a Paris medium known as Madame D.¹²⁴ After their initial meeting with the medium, members attempted, on a number of occasions, to enter a trance state as a means to access the unconscious mind. In his autobiography, Man Ray described Robert Desnos’ talent at entering these trance states and recalled that he often became violent and that, following sessions, he had difficulty returning to a waking state.¹²⁵ Breton also described one séance held at Paul Eluard’s house when Desnos, still deep in a trance state, chased the

¹²² Gibson, “Surrealism Before Freud,” 56.

¹²³ André Breton, “The Medium Enters,” In *The Lost Steps (Le Pas Perdu)*, Trans. Mark Polizzotti (Lincoln: University of Nebraska Press, 1996), 89-95. As mentioned, this essay first appeared in *Littérature*, new series 6 (1 November 1922).

¹²⁴ Breton, “The Medium Enters,” 92.

¹²⁵ Man Ray, *Self Portrait* (Boston: Little, Brown and Company, 1988), 223.

host around the yard while brandishing a knife.¹²⁶ Likely due to the violent outbursts during these experiments, the Surrealist interest in these sessions eventually waned.

In 1928, the Surrealists would turn again to the work of these early French psychologists, this time celebrating Charcot's study of hysteria and his use of hypnosis as one possible treatment. Drawing on Charcot's studies, Breton would advocate for the simulation of hysteria and other mental illnesses as yet another automatic mode for creative expression.¹²⁷ Thus for the Surrealists, psychological sources for the movement were deeply entwined with occult practices and Spiritualism.

Members of the Surrealist group also would likely have encountered occult writings and ideas in their admiration of the artists and writers involved in the late nineteenth-century Symbolist movement. Breton, among others, often listed artists and poets associated with symbolism as a precursor to Surrealist creative practice.¹²⁸ As art historian Filiz Eda Burhan has shown, the Symbolists derived a good deal of their

¹²⁶ André Breton, *Conversations: The Autobiography of Surrealism with André Parinaud and Others*, trans. Mark Polizzotti (New York: Paragon House, 1993), 70.

¹²⁷ Breton and Louis Aragon published an article celebrating the fiftieth anniversary of Charcot's designation of hysteria as a psychological disorder in *La Révolution Surréaliste* 11 (1928). See Louis Aragon and André Breton, "The Fiftieth Anniversary of Hysteria," in *What is Surrealism? Selected Writings*, ed. Franklin Rosemont (New York: Pathfinder, 1978), 424-426. See also Anna Balakian, *Literary Origins of Surrealism: A New Mysticism in French Poetry* (New York: New York University Press, 1947), 14-16.

¹²⁸ For more on the Surrealist connection to the Symbolists, see Anna Balakian, *Surrealism: The Road to the Absolute* (Chicago: The University of Chicago Press, 1979), 37-49. Breton would elaborate on the Surrealist admiration for symbolism as well as look to express the innate differences between the two groups in his 1936 essay "The Marvelous against the Mystery," which appeared in *Minotaure* 9 (October 1936). See André Breton, "The Marvelous Against the Mystery," in *Free Rein*, trans. Michel Parmentier and Jacqueline D'Ambrose (Lincoln: University of Nebraska Press, 1995), 1-6.

aesthetic approach from occult sources and practices.¹²⁹ The very term used to designate this diverse group of late nineteenth-century painters and poets suggested a system of correspondence, like that used in many occult theories and practices, which revealed associations between the subjective self and the natural world.

The Late Nineteenth-Century French Occult Revival

By the mid-nineteenth century, interested parties could access a number of histories of occult practices, magic, and witchcraft in addition to a wealth of literature on Spiritualism.¹³⁰ Among the Surrealists, Breton was especially well-read in publications from this era. Details of his book collection, gleaned from the auction listings of the contents of his Paris apartment in 2003, overseen by auction house Camels-Cohen, reveal that Breton was familiar with many of the major French authors on occult phenomena.¹³¹

¹²⁹ Burhan provided the first lengthy, and still relevant, study of Symbolist art and its ties to occult practices. See Filiz Eda Burhan, "Visions and Visionaries: Nineteenth Century Psychological Theory, the Occult Sciences, and the Formation of the Symbolist Aesthetic in France" (Ph.D. diss., Princeton University, 1979). See also Jon Leaver, "'Sorcellerie évocatoire': Magic and Memory in Baudelaire and Éliphas Lévi," *Symposium* 66 (Fall 2012): 139-149; Alain Mercier, *Les Sources ésotériques et occulte de la poésie symboliste, 1870-1914* (Paris: A.-G. Nizet, 1969); and Jean Pierrot, *The Decadent Imagination, 1880-1900* (Chicago: University of Chicago Press, 1981).

¹³⁰ The most useful resource on the eighteenth-century origins of the later nineteenth-century occult revival in France can be found in the work of scholar David Allen Harvey. See David Allen Harvey, *Beyond Enlightenment: Occultism and Politics in Modern France* (Dekalb, IL: Northern Illinois University Press, 2005); and David Allen Harvey, "Beyond Enlightenment: Occultism, Politics, and Culture in France from the Old Regime to the *Fin-de-Siècle*," *Historian* 65 (March 2003): 665-694. According to Harvey, the history of the occult revival, both inside and outside France, was deeply entangled in the greater historical narrative of Enlightenment philosophies as well as religious and political unrest. Moreover, the rise of Freemasonry and associated esoteric organizations helped foster occult interests among the general public.

¹³¹ *André Breton: 42, rue Fontaine* (Paris: Camels Cohen, 2002). The catalog was published as an eight volume edition detailing the lots, which were sold at auction in April 2003. The catalogs are organized as follows: Livres I, Livres II, Manuscrits, Arts populaires, Tableaux modernes (2 volumes), Photographies, and Arts primitifs. Despite efforts to organize a Surrealist archives at a Paris museum or other cultural

Moreover, this book collection suggests that Breton was especially interested in those authors who played a key role in the popularization of astrology and the Tarot during this same era. Among these Éliphas Lévi and Papus (the pseudonym of Gérard Encausse) are of particular value to the current study.¹³² Not only were both men hugely influential figures during the later nineteenth-century occult revival in France, but they also stressed a link between interpretations of the Tarot and astrological symbolism.

As scholar Christopher McIntosh has argued, Éliphas Lévi would change the face of occultist beliefs and practice through his publications due to his ability to both recognize and highlight those shared components of the several distinct sects and independent occult systems of belief.¹³³ Lévi introduced few new or novel approaches to

institution, Breton's daughter Aube was forced to sell the remaining contents of her father's apartment due to increasing financial pressures and a rumored lack of support for such an archive. As it stands, the auction catalog provides one of the most complete records of literary works owned by Breton—at least at the end of his life. For more on the controversy surrounding the auction, see Charles Darwent, "Golden Fleece," *Art Review* 54 (February 2003): 50-55; Richard McMillan, "Breton collection auction- an inside view," *Umbrella* 26 (September 2003): 77-79; and Eric Tariant, "André Breton: cadaver exquis," *Beaux Arts Magazine* 227 (April 2003): 50-51.

¹³² Breton owned first editions of Lévi's *Histoire de la magie* (1860), *La Clé des grands mystères* (1861), and *Fables et symboles* (1862), along with a 1920 reprint of Lévi's 1861 text *Les Mystères de la kabbale* and a 1938 printing of *Dogme et rituel de la haute magie*. While these listings do not indicate that Breton owned copies of Papus' texts, he most likely was aware of Papus through his readings of Oswald Wirth's publications on the Tarot, who assisted Papus with his writings on the Tarot. Breton also would have had some awareness of Papus via his interest in later eighteenth-century occultist Louis-Claude de Saint-Martin and the Martinist sects that Papus helped revive in the later nineteenth century. He owned a copy of Robert Amadou's 1946 historical account of these events, *Louis-Claude de Saint-Martin et le martinisme*. See *André Breton: 42, rue Fontaine*. Volume 2: Livres II. (Paris: Camel Cohen, 2003), 202, 215-216, and 223. Giovanna Constantini also identifies Papus' texts, particularly those on the Tarot, as a resource for Surrealist artists. See Giovanna Constantini, "Le Jeu de Marseille: The Breton Tarot as Jeu de Hasard," in *Esotericism, Art, and Imagination*, ed. Arthur Versluis, Kee Irwin, John Richards, and Melinda Weinstein (East Lansing: Michigan State University Press, 2008), 104-105.

¹³³ Christopher McIntosh, *Éliphas Lévi and the French Occult Revival* (London: Rider and Company, 1972), 69. Occult historian Antoine Faivre concurs and identifies Lévi as the first key figure in the nineteenth-century occult revival. See Antoine Faivre, *Access to Western Esotericism* (Albany: State University of New York Press, 1994). 88. The aforementioned *Éliphas Lévi and the French Occult Revival*

occultism; instead, he understood that the occluded nature of these practices was not only what made them so mystifying and attractive but also so difficult to understand. Lévi's texts were the first widely read compilations of the Western esoteric tradition. They provided, in plain language and for a broad audience, an encyclopedic account of information that had previously only been accessible to occult initiates. The popularity of these texts far outlived their author. For later nineteenth- and early twentieth-century artists interested in mysticism and occult phenomena, Lévi was a frequent resource.¹³⁴ Surrealists, such as Breton, considered Lévi to be a predecessor to the movement, and they relied heavily on his writings in their own understanding of the occult.¹³⁵

Lévi had been introduced to occult literature and ideas in the later 1840s after meeting Hoené Wronski, a Polish mathematician and theosophist with a deep understanding of esoteric knowledge. Under Wronski's tutelage, Lévi undertook an in-depth study of the occult, encountering the work of recent luminaries such as Swedenborg but also returning to the work of past occultists such as Agrippa. Most notably, Lévi would become deeply interested in the Kabbalah, which he would use as a

by McIntosh provides the most comprehensive scholarship to date on Lévi. It includes both biographical information as well as an adept analysis of Lévi's scholarship within its historical context. The most detailed biographical account on Lévi was published by Thomas A. Williams. See Thomas A. Williams, *Éliphas Lévi: Master of Occultism* (University, AL: The University of Alabama Press, 1975). For additional biographical accounts, see also Frank Paul Bowman, *Éliphas Lévi, visionnaire romantique* (Paris: Presses universitaires de France, 1969); and Paul Chacornac, *Éliphas Lévi, rénovateur de l'occultisme en France* (Paris, Chacornac frères, 1926). Breton owned an original edition of Chacornac's biography of Lévi. See *André Breton: 42, rue Fontaine*. Volume 2: Livres II, 215.

¹³⁴ Linda Henderson, "Editor's Statement: Mysticism and Occultism in Modern Art," *Art Journal* 46 (Spring 1987): 6.

¹³⁵ Anna Balakian, *André Breton: Magus of Surrealism* (New York: Oxford University Press, 1971), 34-39.

means to link all other esoteric and religious traditions through a series of correspondences. He argued for a complex system that mixed ancient beliefs with more contemporary practices—within both religious and esoteric traditions—all of which were inherently linked in a single occult root, the texts and teachings of the Holy Kabbalah. Until his death in 1875, Lévi devoted himself to sharing the knowledge and theories he had encountered in his studies in a manner accessible to the general public. His first major occult publication, *Dogme et rituel de la haute magie*, appeared in 1856. It was soon followed by ten additional tomes, some of which were published posthumously.¹³⁶ Of these, *Histoire de la magie* (1860) and *La Clef des grands mystères* (1897) were the most well-known and led to the author's subsequent recognition as one of the most important contributors to French popular understanding of the occult in the later nineteenth century.

Another key figure in the popularization of occult matters in later nineteenth-century Paris was Gérard Encausse, known as Papus. He not only published important texts on astrology and the Tarot, but was also instrumental in fostering public awareness of the occult at the end of the nineteenth and beginning of the twentieth centuries.¹³⁷

¹³⁶ McIntosh provides an excellent list of Lévi's occult publications in French along with notes on subsequent translations, posthumous editions, and reprintings. See McIntosh, *Éliphas Lévi*, 229-230.

¹³⁷ Papus' son, Philippe Encausse, a medical doctor and key figure in the Martinist Order in the twentieth century, published two biographies of his father. See Philippe Encausse, *Papus, Dr. Gérard Encausse, sa vie, son oeuvre* (Paris: Éditions Pythagore, 1932); and Philippe Encausse, *Papus: le 'Balzac de l'occultisme': vingt-cinq années d'occultisme occidental* (Paris: P. Belfond, 1979). See also Marie Sophie André and Christophe Beaufils, *Papus, biographie: la belle époque de l'occultisme* (Paris: Berg International, 1995). Papus' biography has also been addressed in much of the recent scholarship on the Tarot. See Ronald Decker, Thierry Depaulis, and Michael Dummett, *A Wicked Pack of Cards: The Origins*

Papus' work as popularizer at the close of the nineteenth century built upon the earlier work of Lévi. Lévi had published some of the first histories of magical practice and theory intended for a popular readership. Papus looked to these publications as an early basis for his own knowledge on the occult. He was inspired by Lévi's quest to make the esoteric or hidden knowledge of occult practice and ideology, once only available to initiates, transparent for all interested parties. Papus redoubled Lévi's efforts at popularization by introducing new publications for occult writing and by helping to build a community of interested Parisians.

As a part of such efforts, Papus revived the Martinist order, an occultist group first formed in the later eighteenth century by Martinès de Pasqually and Saint-Martin, which saw a swell in membership at the end of the nineteenth century.¹³⁸ In 1888 he also founded one of the major periodicals dedicated to occult matters, *L'Initiation*, which counted Lévi—published posthumously—and Flammarion among its frequent contributors. Largely based upon the journal's success, he also established the Groupe Indépendant d'Études Ésoteriques in 1889. Later renamed École Hermétique in 1894, this open-membership organization provided yet another venue to foster occult interests

of the Occult Tarot (London: Duckworth, 1996), 234-262; and Helen Farley, *A Cultural History of Tarot: From Entertainment to Esotericism* (New York: I. B. Tauris and Company, 2009), 117-119.

¹³⁸ Papus' own publications are some of the most useful resources on Martinism. See Papus, *Louis-Claude de Saint Martin: sa vie—sa voie théurgique—ses ouvrages—son oeuvre—ses disciples suivi de la publication de 50 lettres inédites* (Paris: Demeter, 1988); and Papus, *Martines de Pasqually: sa vie—ses pratiques magiques—son oeuvre—ses disciples suivis des catechisms des Élus Coens; Martinésisme, Willermosisme, Martinisme et Franc-Maçonnerie* (Paris: Télètes, 2005). For a brief history of Martinism, see David Bates, "The Mystery of Truth: Louis-Claude de Saint-Martin's Enlightened Mysticism," *The Journal of the History of Ideas* 61 (October 2000): 635-655; and McIntosh, *Éliphas Lévi*, 20-26.

in Paris. In the ensuing years, he also partnered with Lucien Chamel to open the *Librarie du Merveilleux*, a Paris bookshop specializing in occult publications, and he founded a second popular journal dedicated to occult topics, *Le Voile d'Isis*. Early historian of the occult James Webb considered Papus to be the most significant popularizer of the occult in France and viewed his efforts as more significant than Lévi and his publications.¹³⁹

While Lévi and Papus were not the only figures responsible for the later nineteenth-century revival of occultism in France, their easy-to-understand publications helped bring esoteric knowledge to the masses. Papus especially helped foster a community of individuals interested in occult matters within Paris and his publication and organizational efforts provided new, accessible venues for the exploration of esoteric matters.

The Popularization of Astrology in the Late Nineteenth and Twentieth Centuries

Running parallel to this greater history of occult popularization, the nineteenth and early twentieth centuries also witnessed a resurgence of interest in astrology.

Utilized by mankind since ancient times, astrology's history in the West began in the Babylonian and Assyrian empires.¹⁴⁰ Similar systems existed in the early histories of

¹³⁹ James Webb, *The Occult Underground* (La Salle, IL: Open Court Publishing Company, 1974), 162.

¹⁴⁰ Because of its ties to occultism, many of the available histories of astrology tend to reflect the practices and tendencies of their authors and do not provide the necessary academic and historical objectivity. Nicholas Campion, who heads the Sophia Centre for the Study of Cosmology in Culture at the University of Wales, has written an extensive and reliable, two volume history of Western astrology that accounts for a cultural history of the practice and addresses both its scientific origins and its later occult identity. A more recent text by Campion provides an analysis of the links between the ancient foundations of various religious practices and astrology. This text, along with volume one of his history of astrology, provide an

India, China, and other Eastern empires.¹⁴¹ Part science and part prognostication, astrology established a rhythm and timeline for life.

Despite waning interest in astrology at the dawn of the Christian era and through much of the Middle Ages, the Renaissance in Europe yielded a particularly favorable climate for astrological practice.¹⁴² With the resurgence of classical knowledge and literature, historians and practitioners looked to revitalize ancient approaches to the discipline in their publications. During this same era, astrology also increasingly accrued associations with occultism through the publications of figures such as Paracelsus and Agrippa. However, the gradual acceptance of the Copernican world view in the wake of Nicolaus Copernicus' 1543 publication *De Revolutionibus Orbium Coelestium* would radically alter astrological practice. Subsequent confirmation by Johannes Kepler and

excellent history of ancient astrological practices, from its origins in the Ancient Near East to its spread throughout the Greek and Roman empires. See Nicholas Campion, *A History of Western Astrology*, 2 vols. (New York: Continuum Books, 2008); and Nicholas Campion, *Astrology and Cosmology in the World's Religions* (New York: New York University Press, 2012). See also Roger Beck, *A Brief History of Ancient Astrology* (Malden, MA: Blackwell Publishing, 2007); Benson Bobrick, *The Fated Sky* (New York: Simon and Schuster, 2005); Christopher McIntosh, *The Astrologers and their Creed: An Historical Outline* (New York: Hutchinson and Co., 1969); Antonie Pannekoek, *A History of Astronomy* (New York: Dover Publications, 1961), 19-170; and Jim Tester, *A History of Western Astrology* (Rochester, NY: The Boydell Press, 1987).

¹⁴¹ In his history of astronomy and cosmology, historian of science John North provides a useful overview of astronomical and astrological practices in several non-western traditions, including, China, Japan, India, and Persia. See John North, *Astronomy and Cosmology* (New York: W. W. Norton & Company, 1995), 132-153 and 162-176. For more on the history of Chinese astrology, see McIntosh, *The Astrologers*, 45-58; Joseph Needham, *Science and Civilization in China, Volume 3: Mathematics and the Sciences of the Heavens and the Earth* (New York: Cambridge University Press, 1959); Derek Walters, *The Complete Guide to Chinese Astrology* (London: Watkins Publishing, 2002); and Ho Peng Yoke, *Chinese Mathematical Astrology: Reaching Out to the Stars* (New York: Routledge, 2003).

¹⁴² For more on the history of Renaissance astrology, see Eugenio Garin, *Astrology in the Renaissance: The Zodiac of Life* (Boston: Routledge, 1976); and P. G. Maxwell Stuart, *The Occult in Early Modern Europe: A Documentary History* (New York: St. Martin's Press, 1999).

Galileo Galilei would further complicate the discipline.¹⁴³ Astrologers were forced to either dismiss these new findings or reconceive astrological practice and observation in keeping with the new cosmology. This crisis of approach, coupled with increasing scientific skepticism about the significance and accuracy of the discipline, led to a gradual decline in public interest and practice during the later seventeenth and eighteenth centuries.¹⁴⁴

Astrology became increasingly visible again at the end of the eighteenth century in connection with the growth of freemasonry and related sects. In France, mentions of astrological history and practice appeared in the work of two men more often mentioned in the history of the Tarot: the 1772 publication *Le Zodiaque mystérieux* by Etteilla, and the nine-volume, *Le Monde primitif*, published between 1773 and 1782 by Antoine Court de Gébelin. Despite these mentions of astrology, in France at least, astrological practice

¹⁴³ Despite these new astronomical findings, many of these scientists dabbled in astrological practice, whether publicly acknowledged or not. For more on the astrological pursuits of these men (Copernicus, Kepler, Brahe, and Galileo), see John Christianson, "Tycho Brahe's Cosmology from the Astrologia of 1591," *Isis* 59 (Autumn 1968): 312-318; Mark Graubard, "Astrology's Demise and Its Bearing on the Decline and Death of Beliefs," *Isis* 13 (1958): 210-261; Dorian Giesler Greenbaum, ed., *Culture and Cosmos* (Special Double Issue on Kepler's Astrology) 14 (2010); Paolo Rossi, *The Birth of Modern Science* (Malden, MA: Blackwell Publishers, Inc., 2000); H. Darrel Rutkin, "Celestial Offerings: Astrological Motifs in the Dedicatory Letters of Kepler's *Astronomia Nova* and Galileo's *Siderius Nuncius*," in *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*, ed. William R. Newman and Anthony Grafton (Boston: The MIT Press, 2001), 133-172; and Robert S. Westman, *The Copernican Question: Prognostication, Skepticism, and Celestial Order* (Berkeley: University of California Press, 2011).

¹⁴⁴ The collected essays found in *Astrology, Science, and Society*, edited by Patrick Curry, tracks the rise in astrological practice at the end of the Middle Ages through the seventeenth-century widespread dismissal of the discipline. See Patrick Curry, ed., *Astrology, Science, and Society: Historical Essays* (Wolfeboro, NH: Boydell Press, 1987). See also Keith Thomas, *Religion and the Decline of Magic* (New York: Scribner, 1971).

and related publications remained relatively dormant until the mid-nineteenth century.¹⁴⁵

Information on astrology reappeared in the writings of Lévi, and in the years following his efforts at occult popularization, astrology rose again to public prominence.

In his texts, Lévi did not address astrology at length, except within its role in a longer history of magical or occult practices. However, he was an advocate for a return to traditional astrological practices and expressed his frustrations with any astrological system that did not place primary emphasis on the simple cause-and-effect symbolism of astrological correspondence used in horoscopes and birth charts.¹⁴⁶ In his *Dogme et Rituel de la haute magie*, he argued, “The sky is thus the mirror of the human soul, and when we look into the book of the stars we are really looking into ourselves.”¹⁴⁷

Another notable nineteenth-century French popularizer of astrology was Paul Christian, the pseudonym for Jean-Baptiste Pitois.¹⁴⁸ Christian was a great admirer of Lévi’s work. Prior to his life as an occult author, he worked as an editor for *Moniteur Parisien* and also spent time as a researcher at the Ministry of Public Instruction. His work in libraries during his time at the ministry provided him early access to occult texts

¹⁴⁵ The late eighteenth and early nineteenth centuries saw a strong revival of astrological practice in England. Campion discusses this history at length in chapters thirteen and fourteen of volume two of his history of astrology. See Campion, *A History of Western Astrology, Volume II*, 193-216.

¹⁴⁶ By traditional astrology, I refer to the system of astronomical charting and observation used in horoscopic astrology. McIntosh notes that prior to Lévi very little had been published on astrological practice in recent years with the exception of England, where a resurgence of interest in astrology was already under way. See McIntosh, *Éliphas Lévi*, 130.

¹⁴⁷ Éliphas Lévi, *Transcendental Magic: Its Doctrine and Ritual*, trans. Arthur Edward Waite (London: Rider, 1968), 303.

¹⁴⁸ Very little has been written on the life of Paul Christian. McIntosh provides a brief biography in his longer text on Lévi. See McIntosh, *Éliphas Lévi*, 128-130. See also Campion, *A History of Western Astrology, Volume II*, 224.

and sparked an interest that would lead to his eventual career as a writer. His first major publication on astrology, *Carmen Sybillum*, appeared in 1854. Christian advocated for his own version of astrology steeped in cabbalistic knowledge. Subsequent publications outlined a unique approach to astrological prediction that relied on onomancy, or divination by letters of the name, combined with numerology in order to create a horoscope. Historian Christopher McIntosh argues that this unorthodox approach revealed the way in which traditional observational astrology was relatively forgotten or unknown during the period.¹⁴⁹ Despite his atypical approach, Christian helped bring astrology to public attention. In 1856, a prediction made in *Carmen Sybillum* was linked to the birth of the son of Napoleon III, and Christian saw increased attention within Parisian high society. He would spend the rest of his life working as a respected astrologer and published frequently on the topic.

Papus also contributed to public knowledge of astrology in his texts. He briefly addressed the practice in his 1894 publication *Mystères des sciences occultes*, in a discussion of various occult sciences and systems of divination. His greatest contribution to the field was a text published posthumously in 1920, *Initiation astrologique* [*Astrology for Initiates*]. In his introduction to the text, Papus stressed that he was not a specialist in astrology and hoped instead to present the basics of the discipline that would be necessary for any study of magic and the occult. As such, he implied that astrology was an integral component of occultism. He wrote, “In the present work we don’t present the

¹⁴⁹ McIntosh, *Éliphas Lévi*, 130.

means of erecting a horoscope: this constitutes a practical exercise of the astrological science, and should be done by specialists more competent than ourselves.”¹⁵⁰ Despite this disclaimer, Papus provided a step-by-step account of much of the major symbolic and observational tactics of the practice. This included discussions of the symbols and glyphs used in various astrological charts, an explanation of planetary aspects, a lengthy treatment of the signs of the zodiac and their various interpretations, as well as a brief explanation of how such astrological evidence might be applied within other divinatory traditions. While a reader would need to seek out further sources or training in order to learn astrological charting or how to construct a horoscope, Papus’ text made much of the symbolism of astrology accessible to any interested party. Moreover, Papus emphasized that any serious inquiry into occult matters must include an introduction to astrology.

During the late nineteenth and early twentieth centuries, French astrologers continued to publish and sought to revive interest in the field outside of its larger occult associations.¹⁵¹ While French popular enthusiasm for astrology remained relatively tempered in the early decades of the twentieth century, interested readers could consult publications by the likes of F. Charles Barlet, André Boudineau, Paul Choissard,

¹⁵⁰ Papus, *Astrology for Initiates: Astrological Secrets of the Western Mystery Tradition*, trans. J. Lee Lehman (York Beach, ME: Samuel Weiser, Inc., 1996), xx.

¹⁵¹ Scholarship on the history of French astrology in the twentieth century is limited. Patrice Guinard completed a dissertation on astrology in France in 1993 at the Sorbonne. He then founded the C.U.R.A., or the Centre Universitaire de Recherche en Astrologie (The International Astrology Research Center). The foundation’s website includes brief publications on astrological topics, including a brief history of astrology and major figures in the field by Guinard. See Patrice Guinard, “L’Astrologie: fondements, logique, et perspectives” (PhD diss., Sorbonne, 1993); and Patrice Guinard, “French Astrology in the Twentieth Century,” trans. James Eliot, Accessed May 1, 2013. <http://cura.free.fr/docum/16afr-en.html>.

Fomalhaut, Julevno, and Henri Selva.¹⁵² Breton was familiar with the work of Julevno, pseudonym of Jules Eveno, who published several widely popular manuals on astrological techniques and practice that saw multiple reprintings.¹⁵³ Further instruction and information could also be found in a number of short-lived periodicals dedicated to astrology, including *La Science Astrale* (1904-1908), *Le Déterminisme Astral* (1904-1905), and *L'Influence Astrale* (1913-1914). By the 1930s, a growing audience for such publications and stronger organizational efforts led to the foundation of long-running periodicals, including *L'Astrosophie* (1929-1960) and *Les Cahiers Astrologiques* (1938-1983).

During the 1930s astrology also attracted a wider, popular audience via the horoscopes and astrological columns that were increasingly featured in non-specialist periodicals and magazines. Britain's *Sunday Express* featured the first daily horoscope in August of 1930. The popularity of such columns in mass market periodicals and magazines soon led to similar sections in publications throughout Europe and America.¹⁵⁴ These horoscopes and astrological columns did not provide the public with the most accurate understanding of the complexities involved in astrological charting and predictions. Moreover, the brevity of newspaper horoscopes rarely conveyed or even encouraged a more than cursory engagement with astrology. However, these popular

¹⁵² See McIntosh, *The Astrologers*, 99.

¹⁵³ Breton owned a 1928 edition of *Nouveau traité d'astrologie pratique*. See *André Breton: 42, rue Fontaine*. Volume 2: Livres II, 212.

¹⁵⁴ Campion, *A History of Western Astrology*, Vol. 2, 259; and McIntosh, *The Astrologers*, 98-99. For more on the history of horoscopic astrology, see James Herschel Holden, *A History of Horoscopic Astrology* (Tempe, AZ: American Astrologers, Inc., 2006).

publications did foster increased public awareness of the field and made the horoscope a part of everyday parlance.

The Popularization of the Tarot in the Late Nineteenth and Twentieth Centuries

While astrological popularization in the nineteenth and twentieth centuries remained relatively truthful to the field's ancient origins and long-standing practices, the popularization of the Tarot during this same period invented hermetic significance and supposed ancient origins. The Tarot deck's genesis in a card game devised in fourteenth-century Italy would remain forgotten until the late twentieth century. Scholar Michael Dummet provided the first accurate history of the Tarot in his 1980 text *The Game of Tarot*.¹⁵⁵ Prior to Dummet's publication, practitioners and the public alike believed that the Tarot deck was a part of a larger set of occult and divinatory practices. Histories of the deck claimed various points of ancient origin; especially popular was a link between the deck and the ancient Egyptians. However, at their introduction in Europe in the mid-fifteenth century, the tarot had no links to esoteric knowledge or occult practice.

Connections between the Tarot deck and divination began in the early eighteenth century. As Decker, Depaulis and Dummet have noted, cartomancy was not practiced in

¹⁵⁵ Michael Dummet, *The Game of Tarot from Ferrar to Salt Lake City* (London: Gerald Duckworth & Co. Ltd., 1980). For more on the history of the tarot deck and playing cards in Europe, see also Ronald Decker, Thierry Depaulis, and Michael Dummett, *A Wicked Pack of Cards: The Origins of the Occult Tarot* (London: Gerald Duckworth and Co. Ltd., 1996); Ronald Decker and Michael Dummett, *A History of the Occult Tarot 1870-1970* (London: Gerald Duckworth and Co. Ltd., 2002); Helen Farley, *A Cultural History of Tarot: From Entertainment to Esotericism* (New York: I. B. Tauris & Co., Ltd., 2009); Stuart Kaplan, *The Encyclopedia of Tarot, Volume II* (Stamford, CT: U.S. Games Systems, Inc., 2008); Robert M. Place, *The Tarot: History, Symbolism, and Divination* (New York: Penguin Group, 2005); and Roger Tilley, *Playing Cards* (New York: G. P. Putnam's Sons, 1967).

Western Europe, with the tarot or other card decks, prior to the eighteenth century.¹⁵⁶ It was not until French occultists, such as Antonie Court de Gébelin and Etteilla, encountered the deck later in the eighteenth century that the tarot would begin to take on its invented magical heritage. Breton would have been aware of these early popularizers of the Tarot due to their inclusion in a history of the practice found in occult historian Grillet de Givry's 1929 publication *Le Musée des sorciers, mages et alchimistes*.¹⁵⁷

The key contributor to the tarot deck's use in occultism was Antoine Court de Gébelin, who first wrote about the Tarot in 1781 in volume eight of his *Le Monde primitif*.¹⁵⁸ His ideas on the Tarot would spawn all subsequent occult interpretations of the deck. After first encountering the Tarot in a Parisian salon, Court de Gébelin insisted that the trump cards helped disguise ancient secrets via allegory. According to his theory, the symbolism of the deck was the last remnant of the Book of Thoth, an ancient Egyptian hermetic text.¹⁵⁹ Court de Gébelin argued that rather than risk misuse via

¹⁵⁶ Decker, Depaulis, and Dummett, *A Wicked Pack of Cards*, 47.

¹⁵⁷ Grillet de Givry does not provide any radically new interpretations of the Tarot in his text, nor does his account of the practice purport to be anything more than a compilation of the supposed ancient origins of the deck and a brief history of the later eighteenth- and early nineteenth-century revival of the deck in French occultism. See Grillet de Givry, *Witchcraft, Magic, and Alchemy* (New York: Dover, 1971), 280-298. Breton owned copies of both the original 1929 edition of this text as well as the author's *Anthologie de l'occultisme* (1922). See *André Breton: 42, rue Fontaine*. Volume 2: Livres II, 211. Surrealist scholar M. E. Warlick also notes that Grillet de Givry's text was a resource for the Surrealists. See Warlick, *Max Ernst and Alchemy*, 30-31.

¹⁵⁸ For more on Court de Gébelin, see William Henry Alexander, "Antoine Court de Gébelin and His *Monde Primitif*" (PhD diss., Stanford University, 1972).

¹⁵⁹ Court de Gébelin argued that the word Tarot was derived from two Egyptian words "Tar" and "Ros," which he argued translated as "road" and "royal." These linguistic roots were exceedingly far-fetched given that his publication preceded the translation of the Rosetta Stone by more than forty years. His interest in Egypt, however, was not without precedence. French interest in Egyptian artifacts and discovery

printed copies or even oral transmission, ancient sages disguised their ancient wisdom in the images of the trump cards. With no foundation in any preexisting scholarship or histories of the Tarot deck, he managed to invent a whole new occult history for the deck.

While Court de Gébelin lent the Tarot its first associations with occultism and hermetic knowledge, Etteilla popularized the deck's use in divination. Born Jean-Baptiste Alliette, Etteilla began publishing on the cartomancy in the 1770s. His first books on the Tarot did not appear until 1782, likely inspired by Court de Gébelin's recent text. Etteilla established early interpretations of the trump cards and described basic card spreads for readings. Etteilla's deck and publications led to a subsequent rise in the number of practicing Parisian cartomancers in elite society, whose activities would have further established popular knowledge of the deck.¹⁶⁰

Over the course of the nineteenth century, the Tarot was referenced—if only in passing—in almost every major publication on occultism. Lévi addressed the Tarot at length in his publications, and he was the first writer to devise a series of correspondences between the deck's twenty-two major arcana and the twenty-two paths

followed on the heels of publications, including Benoît de Maillet's *Description de l'Égypte* (1735) and Bernard de Montfaucon's ten volume text *L'Antiquité expliquée et représentée en figures* (1719-1724), which resulted in a popular Egyptomania that would last well into the nineteenth century. For more on Egyptomania in France during the era and its subsequent impact on both occultism and culture at large, see James Stevens Curl, *Egyptomania: The Egyptian Revival, a Recurring Theme in the History of Taste* (New York: Manchester University Press, 1994), 68-71 and 76-79.

¹⁶⁰ These card readers included Mademoiselle Marie-Anne Adelaide Lenormand, who was active at the beginning of the nineteenth century and who counted the Empress Joséphine among her clientele. For a lengthier discussion of Lenormand and her work as a cartomancer, see Decker, Depaulis, and Dummett, 116-142. For more information Lenormand as well as others using Tarot for fortune-telling in early nineteenth-century France, see David Allen Harvey, "Fortune-Tellers in the French Courts: Antidivination Prosecutions in France in the Nineteenth and Twentieth Centuries," *French Historical Studies* 28 (Winter 2005): 131-157.

represented in the Kabbalah's Tree of Life. Similarly, and perhaps more importantly, he connected the major arcana to the signs of the zodiac. This added astrological significance established a link between the deck and astronomy.

Expanding upon Lévi's ideas, Papus published *Le Tarot des Bohémiens* [*The Tarot of the Bohemians*] in 1889.¹⁶¹ His text included the essay "On the Astronomical Tarot," by occultist Oswald Wirth, which established an even more complex system of correspondence between the major arcana and constellations, both those of the zodiac and those outside it. Wirth both charted these relationships and included a planisphere, an analog for a star chart, that represented the connections between the deck and the heavens. A revised version of this essay appeared in Wirth's later 1927 publication *Le Tarot des imagiers du moyen âge* [*The Tarot of the Magicians*]. Breton was well acquainted with this text, and, as will be discussed in Chapter Five, he based a good deal of his own understanding of the deck on Wirth's explanations.¹⁶²

While the Tarot did not see widespread popular recognition by the early twentieth century, the revival of interest in occultism beginning around the mid-nineteenth century in France helped establish the deck's importance within occultist circles. Publications by Lévi, Papus, and Wirth, all known to Breton, also established the idea of an astronomical tarot and a means of interpreting the deck based on astrological associations. Thus, the Tarot and astrology provided yet another way to understand the cosmos. These occult

¹⁶¹ Papus, *The Tarot of the Bohemians: The Absolute Key to Occult Science*, trans. A. P. Morton (Hollywood: Melvin Powers Wilshire Book Company, 1972).

¹⁶² See *André Breton: 42, rue Fontaine*. Volume 2: Livres II, 223.

astronomies, in combination with other efforts at astronomical popularization previously discussed, provided a backdrop for the larger body of Surrealist work dedicated to astronomical subjects. At a moment in France when the public was eager to know more about the universe, ready access to all things astronomical could be found—be it in the strange world of science fiction, the occult practices of astrology and the tarot, or the more serious output of scientific popularizers.

Chapter 2

Science in the Streets: Astronomical Encounters in Surrealist Paris

The Surrealists' Paris, too, is a "little universe." That is to say, in the larger one, the cosmos, things look no different. There, too, are crossroads where ghostly signals flash from the traffic, and inconceivable analogies and connections between events are the order of the day. It is the region from which the lyric poetry of Surrealism reports. —Walter Benjamin, "Surrealism: The Last Snapshot of the European Intelligentsia"¹⁶³

The street, which I believed could furnish my life with its surprising detours; the street with its cares and its glances, was my true element: there I could test like nowhere else the winds of possibility.—André Breton, *Le Pas Perdu* [The Lost Steps]¹⁶⁴

In his 1929 essay on Surrealism, Walter Benjamin proposed that the city of Paris served as both the real object of Surrealist attention and the root of their subject matter rather than the unconscious mind or the dreamscape. Without Paris, it seems, the Surrealist project would have been left wanting. Breton also indicated in essays and interviews that Paris was an important key both for Surrealist creative output and for the movement's very foundations. The city inspired members who wandered the streets searching for chance encounters that might somehow unlock the unconscious mind. The

¹⁶³ Walter Benjamin, "Surrealism: The Last Snapshot of the European Intelligentsia" in *Reflections: Essays, Aphorisms, Autobiographical Writings*, trans. Edmund Jephcott (New York: Schocken Books, 1978), 183. First published in *Literarische Welt*, V (1929) in four installments.

¹⁶⁴ André Breton, "The Disdainful Confession," in *The Lost Steps*, trans. Mark Polizzotti (Lincoln: The University of Nebraska Press, 1996), 4.

Surrealists became, in effect, the flâneurs of the twentieth century, and the city helped shape and define their artistic output.

Benjamin describes the Paris of the Surrealists as a “little universe” that was a mirror for a larger cosmos. His allusion to a Surrealist universe is certainly suggestive. As Benjamin notes, Paris was the very center of the Surrealist experience and yet at the same time “the most dreamed-of of their objects.”¹⁶⁵ These artists were deeply in tune with Paris and all it had to offer. At the same time they mapped their own Surrealist concerns, desires, and ideas on to the city. There were then two cities, Paris and Surrealist Paris. Both offer us a glimpse into the daily experiences and sources for this diverse collective.

This chapter explores the streets of Paris as a means to understand just some of the specific ways in which astronomy was present in the daily lives of the Surrealists. As chapter one has shown, the popularization of astronomy certainly served as a major impetus for Surrealist responses to the cosmos. This chapter, however, takes a more direct approach. By examining the junctures between sites of astronomical import—both great and mundane—and Surrealist haunts in the city, this research suggests that proximity and accessibility were just one more way to explain the Surrealist fascination with astronomy. The proximity of many of the major studios, meeting places, and other frequent group haunts to major sites for astronomical research, such as the Paris Observatory, as well as the bookstores and newsstands that kept the larger public

¹⁶⁵ Benjamin, “Surrealism,” 182.

apprised of topics of astronomical interest reveals the presence of astronomical ideas and phenomena in the daily lives of these artists. These venues offered the Surrealists either a fleeting impression of astronomy—flashing past in headlines and photographs or in their mundane and daily movement through the city—or a site for further research, dependent on the individual. For example, Man Ray's painting *Observatory Time—The Lovers* (1932-1934) [Fig. 5] prominently features the Paris Observatory as a part of his imagined landscape. While Man Ray never demonstrated a deep engagement with astronomical ideas in his work, the inclusion of the observatory in his painting reveals the way in which this site would have been a prominent and daily visual reminder of all things astronomical for many artists in the group.

This chapter then turns to a site of specific Surrealist engagement with astronomy, the 1937 opening of the Palais de la Découverte in conjunction with the 1937 Exposition Internationale des Arts et Techniques dans la Vie Moderne. Originally designed as a temporary installation, enthusiastic public support and the passion of organizers would lead the city to make the museum a permanent attraction in the city. In addition to a wing devoted to astronomy, the museum would also host the city's first planetarium.

The Palais de la Découverte was enthusiastically received by the French public, and Surrealist artists recall visiting the site. Thus the Palais can be read as yet another important point of access that served to further spark Surrealist engagement with the cosmos. Moreover, the museum was notable for its early adoption of new and interactive display tactics. This shift from the museum as a site of retrospective and simple displays

to one of active visitor participation may well have stimulated an evolution in Surrealist exhibition practices. The 1938 Surrealist Exhibition opened in January just weeks after the conclusion of the Paris exposition. Both the scientific displays at the Palais de la Découverte and this smaller gallery exhibition sought to disrupt traditional viewer experiences and display tactics by including interactive components; organizers chose such tactics with the hopes of further innervating popular interest in science and Surrealism respectively.

SURREALIST AND ASTRONOMICAL PARIS AS CREATIVE IMPETUS

Despite its common association with the dream state and Freudian psychology, Surrealist authors and artists were also deeply concerned with chance encounters in everyday life. For these artists and authors, closer reflection on ordinary ephemera might yield creative provocation. Walter Benjamin, in his essay “Surrealism: The Last Snapshot of the European Intelligentsia” recognized that Surrealist literary output—and by extension their visual production—was not simply the result of creative or unconscious invention but also stood as a document of their lived experiences in the world. Benjamin writes,

But anyone who has perceived that the writings of this circle are not literature but something else—demonstrations, watchwords, documents, bluffs, forgeries if you will, but at any rate not literature—will also know, for the same reason, that the writings are concerned literally with experiences, not with theories and still less with phantasms. And these experiences are by no means limited to dreams, hours of hashish eating, or opium smoking.¹⁶⁶

¹⁶⁶ Benjamin, “Surrealism,” 179.

Thus, Surrealism was a movement that was not based solely in imagination and the unconscious; or, these were not the only modes for generating Surrealist concerns. Instead, the streets of Paris and the experience wandering through the city were of equal importance, and many Surrealists sought to find the surreal in daily life. As anthropologist James Clifford noted of the Surrealist's creative reliance on the spaces of Paris, the city "was a source of the unexpected and the significant—significant in ways that suggested beneath the dull veneer of the real the possibility of another, more miraculous world."¹⁶⁷

In 1924, the same year as the movement's first manifesto, Breton published *Les Pas Perdus*, his first collection of critical articles. In the first essay from the collection, entitled "The Disdainful Confession" Breton detailed some of the figures who had the greatest intellectual impact on his creative career.¹⁶⁸ In this essay he also highlighted the role of the street as his "true element," a space for—one might assume Surrealist—experimentation and discovery.¹⁶⁹ Similarly, in *The Arcades Project* Walter Benjamin noted, "The father of Surrealism was Dada; its mother was an arcade."¹⁷⁰ Both Breton

¹⁶⁷ James Clifford, "On Ethnographic Surrealism," *Comparative Studies in Society and History* 23 (October 1981): 542.

¹⁶⁸ The primary focus of the essay was his encounters with author Jacques Vaché, first in an army neurological hospital during World War I and later in Paris prior to Vaché's suicide. The essay was published, in several installments, with the title "La Confession dédaigneuse," and appeared in early 1923 in the journal *La Vie Moderne*. See Breton, *The Lost Steps*, 127.

¹⁶⁹ Breton, *The Lost Steps*, 4.

¹⁷⁰ Walter Benjamin, *The Arcades Project*, trans. Howard Eiland and Kevin McLaughlin (Cambridge MA: The Belknap Press of Harvard University Press, 1999), 82.

and Benjamin insisted that the city was vital for the genesis of Surrealism. For Breton, random happenstance on the streets might serve as a conduit for contact with the unconscious mind. For Benjamin, Surrealism was indelibly linked to the late nineteenth-century flâneur, and his evocation of the city's Arcades linked Surrealist practice to this wandering observational mode.

In many of his most well-known later texts, Breton recounted his experiences—adventurous but more often mundane—in the environs of Paris.¹⁷¹ His novel *Nadja*, published in 1928, tells the story of the author's brief affair with a woman, whom he encountered on a stroll through the city.¹⁷² Although billed as a Surrealist romance, the text instead emphasizes a careful retelling of Breton's experiences in Paris. In the novel, some 20 separate locations are mentioned by Breton during his pursuit of the young but troubled Nadja. He carefully records addresses and sites that he encounters as he traversed the city, and he supplements this careful attention to place with photographic illustrations of some of these locations. Of the 46 illustrations included in the text—photographs, portraits, drawings by the Nadja, and reproductions of works of art—13 depict sites he visited.

Many of the places Breton highlights in the text are not the typical monuments and celebrated locales of tourist guides and panoramic city views. As Margaret Cohen has noted, Paris, as described in the pages of *Nadja* does not provide a reader with an

¹⁷¹ Scholar Michael Sheringham has argued similarly for the importance of the streets and the everyday as a space of great creative import for the Surrealists. See Michael Sheringham, *Everyday Life: Theories and Practices from Surrealism to the Present* (New York: Oxford University Press, 2006), 59-94.

¹⁷² André Breton, *Nadja*, trans. Richard Howard (New York: Grove Press, 1960).

“encompassing” or “panoramic glance”; instead the text recounts Breton’s “tangential” and wandering trail through the city.¹⁷³ The book was as much a love story as it was a personal travelogue. It details Breton’s Paris, which is neither monumental nor seemingly profound. Yet, it was this wandering that provided Breton access to chance encounters with the marvelous and possible creative stimulus. *Nadja* serves as evidence of the Surrealist reliance on Paris in their creative process. The experience of the city, the act of wandering, the surprises it might reveal, and even the return to old haunts could all serve to trigger the unconscious mind. More simply put, the act of wandering through the city was yet another form of Surrealist automatism.

Published in 1926, Louis Aragon’s *Paris Peasant* provides a similar emphasis on the city of Paris as a space for Surrealist encounters.¹⁷⁴ In the text Aragon chronicles his visits to the Passage de l’Opera and the Buttes-Chaumont, a park in the north eastern part of the city. He notes that he did not consider himself to be a spectator of the world; instead, he sees his experiences in the crowded shops, dark bars, and brothels of the Passage de l’Opera as a fortuitous experience, but one which might also have suggestive or creative potential. He writes, “But honestly, I would never have thought of myself as an observer. I like to let the winds and the rain blow through me: chance is my only

¹⁷³ Margaret Cohen, *Profane Illumination: Walter Benjamin and the Paris of Surrealist Revolution* (Berkeley: University of California Press, 1993), 79.

¹⁷⁴ Louis Aragon, *Paris Peasant*, trans. Simon Watson Taylor (Boston: Exact Change, 1994).

experience, hazard my sole experiment.”¹⁷⁵ His focus on chance seemingly insists that anything can be a catalyst for Surrealist literary and artistic endeavors.

In the second half of the novel, Aragon recounts a nighttime stroll through the Buttes-Chaumont park with Breton and Marcel Noll. Aragon describes their experience: “a miraculous hunt opened up before us, a field of experiment where it was unthinkable that we should not receive countless surprises and who knows ? a great revelation that might transform life and destiny.”¹⁷⁶ After leaving a late night gathering at Breton’s apartment, Aragon, much like Breton’s meticulous notations in *Nadja*, recounts the exact route as their taxi races through the vacant city streets. Once they reach the park, Aragon continues with his thorough account of the evening. He tells his readers he feels mysteriously possessed “to dwell on [the night’s] infinite details.”¹⁷⁷ Aragon’s focus on the minutiae of lived experience reveals yet again the Surrealist conviction that anything might lead to unconscious or Surrealist encounters. He notes, “I thought of tracing a map of the mind and, in pursuit of my reflections, proposed a path to the *frisson*.”¹⁷⁸ Thus, for Aragon, the mapping of lived experience can provide a path toward creative discovery or, in Aragon’s terms, the creative spark or tingle.

Given this reliance on the everyday encounters of the city as a wellspring for Surrealist creation and the preponderance of astronomical references in their work, it

¹⁷⁵ Aragon, *Paris Peasant*, 88.

¹⁷⁶ Aragon, *Paris Peasant*, 133. The question mark is included as it appears in the original text.

¹⁷⁷ Aragon, *Paris Peasant*, 148.

¹⁷⁸ Aragon, *Paris Peasant*, 185.

should come as no surprise that many Surrealists would have encountered spaces and sources of astronomical import in their daily experience of the city. Perhaps the most accessible venue for a Surrealist encounter with popular ideas on science and astronomy were the city's numerous book stores, magazine sellers, and newsstands scattered throughout the city. As previously demonstrated in Chapter One, popular science periodicals, illustrated serials, and comics all helped encourage a popular understanding of astronomical concerns. And, as the Surrealists wandered the streets they encountered countless magazine sellers and newsstands, not to mention book stalls and stores. While browsing the covers and perusing the pages of the stock at these spots, they were likely to have seen widespread coverage of astronomy and related fields.

In *Paris Peasant*, Aragon notes that one book seller in the Passage de l'Opera was a favored shop among his Surrealist compatriots because it was one of the few in Paris where he could "glance through the magazines without buying them."¹⁷⁹ He even specifically mentions the shop's window displays of scientific publications. Although destroyed in 1925 when the Boulevard Hausmann was extended, the Passage de l'Opera was an important site during the Surrealist movement's earliest years. Before the demolition, Aragon and Breton met regularly with their peers at the Certa café, also in the Passage.¹⁸⁰ With so much time spent here, other Surrealists may have browsed the selection at this same book shop.

¹⁷⁹ Aragon, *Paris Peasant*, 18.

¹⁸⁰ Dan Franck, *Bohemian Paris: Picasso, Modigliani, Matisse and the Birth of Modern Art*, trans. Cynthia Hope Liebow (New York: Grove Press, 2001), 381.

In addition to these sorts of book shops and magazine stalls, specialist bookstores, especially those that featured texts on the occult and mysticism, were readily accessible to the Surrealists. During the 1920s to 1940s, occult book sellers were clustered along the Rue Saint-Jacques and the Boulevard Saint-Germain in the city's fifth arrondissement. These shops offered both specialist periodicals and books on a diverse range of related topics. Breton was a frequent visitor to the bookstores in this area around the Sorbonne; and, considering his interest in topics such as the Tarot and astrology, he most certainly would have visited these occult specialists. The nearby Place St.-Germain des-Prés in the sixth arrondissement had long been an avant-garde haunt and hosted numerous literary groups and artists at cafes such as Les Deux Magots.¹⁸¹ Just after World War I, Breton lived at the Hotel des Grands Hommes, located across the street from the Pantheon and a mere two blocks west of Rue Saint-Jacques and its assorted occultists.¹⁸² Furthermore, these bookstores were not all that far from cafes in Montparnasse, such as La Coupole, Le Dôme, and Le Rotonde, where the Surrealists held some group meetings and discussions.¹⁸³

Paris museums also offered the Surrealists the opportunity to explore astronomical apparatuses as well as related scientific findings. In the 1910s, the city's Conservatoire des Arts-et-Métiers was a location frequented by Surrealist collaborator

¹⁸¹ Lawrence Martin and Sylvia Martin, *Paris and its Environs: An Uncommon Guide* (New York: McGraw-Hill Book Company, Inc., 1963), 204.

¹⁸² Franck, *Bohemian Paris*, 381

¹⁸³ Franck, *Bohemian Paris*, 382.

Marcel Duchamp when preparing his notes for the *Large Glass*.¹⁸⁴ The museum first opened in 1794, and the collection was intended to encourage continued industrial progress by highlighting the design ingenuity seen in the objects and apparatuses of science and scientific discovery.¹⁸⁵ Rooms nineteen and twenty featured astronomical instruments, surveying equipment, clocks, and mathematical devices. Here one could observe ancient astrolabes and globes, orreries, other astronomical models, and telescopes.¹⁸⁶

Located in the fifth arrondissement, just west of Breton's one time living quarters at the Hotel des Grands Hommes, the Jardin des Plantes was Paris' botanical garden. The site also featured a natural history collection; in the mineralogical and geological galleries, visitors could peruse a collection of nearly 700 meteorites.¹⁸⁷ Given the Surrealist interest in anthropology and other related fields, visits to this museum would not have been out of the question for members of the Surrealist group.¹⁸⁸

Perhaps the greatest museum or professional site for astronomical investigation was the city's observatory. It was also the closest location to the daily lives of Surrealists

¹⁸⁴ Linda Henderson, *Duchamp in Context: Science and Technology in the Large Glass and Related Works* (Princeton, NJ: Princeton University Press, 1998), 17.

¹⁸⁵ Eugene S. Ferguson, "Technical Museums and International Exhibitions," *Technology and Culture* 6 (Winter 1965): 33.

¹⁸⁶ John George Bartholomew, *Paris for Everyman: Her Present, Her Past, and Her Environs* (New York: E. P. Dutton & Co., 1924), 248.

¹⁸⁷ Bartholomew, *Paris for Everyman*, 127-128.

¹⁸⁸ For more information on the links between Surrealism and anthropology, see Lieve Spaas, "Surrealism and Anthropology: In Search of the Primitive," *Paragraph* 18 (July 1995): 163-173; and Louise Tythacott, *Surrealism and the Exotic* (New York: Routledge, 2003).

who lived in or frequented the Montparnasse neighborhood in the city's fourteenth arrondissement. As mentioned, the cafes along the Boulevard Montparnasse often hosted group meetings. While the observatory was closed to the public, interested parties could write a letter to gain an appointment on the first Sunday of the month.¹⁸⁹ Despite this limited access, the building's commanding presence on the skyline of Montparnasse would have served as an almost constant reminder of astronomy for visitors and residents alike.

Opened on June 21, 1667 during the reign of Louis XIV, the Paris Observatory was originally located outside of the city center. The site chosen due to the available views and surrounding topography, and it also defined the Paris Meridian.¹⁹⁰ Along with its sister site in Meudon, southwest of the city, the Paris Observatory was linked to a number of major discoveries over the course of its history. In 1679 Jean-Dominique Cassini, the first director, produced what was thought to be the most reliable map of the moon prior to the advent of photography. Enlightenment scientist Lavoisier completed much of his work on metric measures of mass here in the eighteenth century; and, in 1852, Léon Foucault debuted his pendulum, demonstrating the rotation of the earth. In 1845, Foucault and Fizeau produced the first daguerreotype of the sun, successively marrying photographic practice and astronomical discovery. The site's telescopes continued to see use until 1960 when light pollution from the city prevented adequate

¹⁸⁹ Martin and Martin, *Paris and its Environs*, 243.

¹⁹⁰ Suzanne Débarbat, "L'Observatoire de Paris," In *Montparnasse et le XIV^e arrondissement*, ed. Gilles-Antoine Langlois (Paris: Action Artistique de la Ville de Paris, 2000), 76.

observational conditions, but the observatory still functions as a site for research and analysis of observational data from the Meudon Observatory, located in a southwestern Paris suburb.¹⁹¹

Taking up just over four long blocks south of the intersection of the Boulevard du Montparnasse and the Boulevard de Port Royal, the Paris Observatory sat in the heart of a neighborhood that had long been frequented by artists and other avant-garde figures. Starting just after the turn of the twentieth century, this Paris quarter became the home to a thriving artistic and literary community of Parisians and expatriates alike. If Montmartre, in the northern, eighteenth arrondissement of the city, had been the hub of nineteenth-century artistic life, then Montparnasse was the heir apparent to this artistic throne as early as 1910. While Breton increasingly chose not to associate both himself and the Surrealist movement with this neighborhood by the 1930s, a number of Surrealist artists still chose to rent studios and apartments in the area or would have had dealings with neighborhood art galleries. For example, Yves Tanguy had an apartment and studio at no. 54 Rue du Château, west of the Observatory.¹⁹²

¹⁹¹ For more on the history of the Paris Observatory, see David Aubin, "The Fading Star of the Paris Observatory in the Nineteenth Century: Astronomers' Urban Culture of Circulation and Observation," *Osiris* 18 (2003): 79-100; Charles Fehrenbach, *Des Hommes, des télescopes, des étoiles* (Paris: Éditions du Centre Nationale de la Recherche Scientifique, 1990); and Observatoire de Paris, *Trois Siècles d'astronomie: 1667-1967* (Paris: Observatoire de Paris, 1967). In 1927, the Meudon and Paris Observatories were officially joined under a single directorship that allowed the sites to better share projects. It was around this time that the Paris site shifted primarily to data analysis and Meudon became the primary site for observational astronomy. See Jacques Lévy, "Paris Observatory," In *The General History of Astronomy, volume 4, Astrophysics and Twentieth-Century Astronomy to 1950: Part A*, ed. Owen Gingerich (New York: Cambridge University Press, 1984), 118. The Paris Observatory also currently maintains a radio astronomy observatory at Nançay. The site is located approximately two hours south of Paris and was inaugurated in 1965.

¹⁹² Franck, *Bohemian Paris*, 383.

American photographer and artist Man Ray resided at a number of addresses in and around Montparnasse after first moving to Paris in July 1921.¹⁹³ The artist initially lived in a small hotel in the northwest of the city at the suggestion of Duchamp. But, within four months of his arrival in the city, Man Ray moved to Montparnasse. He first took a room at the Grand Hotel des Écoles at 15 Rue Delambre, located one block south of the Boulevard Montparnasse and Le Dôme café.¹⁹⁴ He then briefly stayed at the Hotel Istria on Rue Campagne-Première before moving a few doors down into a studio that he shared with his model and then-lover Alice Prin, who was more widely known as Kiki de Montparnasse.

In 1929, Man Ray moved his studio to Rue Val-de-Grâce, approximately three blocks north of the Observatory.¹⁹⁵ He lived here with then lover and photographic partner, Lee Miller. But, following their tumultuous break up in 1932, Man Ray recounts in his autobiography how the image of a large pair of lips—inspired by a photographic enlargement produced during his early experiments with color photography—seemed to haunt his dreams.¹⁹⁶ He hung a large 8 foot canvas over his bed in the small apartment, and he notes that he spent a few hours each morning working on the painting, standing on his bed while still in his pajamas. In his autobiography, Man

¹⁹³ For more on Man Ray's life and art, see Merry A. Foresta, ed., *Perpetual Motif: the Art of Man Ray* (New York: Abbeville Press, 1988).

¹⁹⁴ For a list of Man Ray's various residences in the neighborhood, see Brian M. Morton, *Americans in Paris: An Anecdotal Street Guide* (Ann Arbor, MI: The Olivia and Hill Press, 1984).

¹⁹⁵ Morton, *Americans in Paris*, 272.

¹⁹⁶ Man Ray, *Self Portrait*, 206-207.

Ray noted that he was initially obsessed with finishing the painting very quickly. He had hoped to mimic the immediacy of the photographic medium in which he often worked. But, in the end, and perhaps due to his lingering feelings for Lee, he spent 2 years completing the work.

In addition to the huge red lips, Man Ray described the work as having “a bluish gray sky over a twilit landscape with an observatory and its two domes like breasts dimly indicated on the horizon;” he further recalled that the image of the observatory was “an impression of [his] daily walks through the Luxembourg Gardens.”¹⁹⁷ Man Ray must have passed by the Observatory or seen the structure towering over the neighborhood on a daily basis. While his larger oeuvre demonstrated little concern for other astronomical phenomena, this work stands as a testament to an idea of Surrealist proximity to astronomical sites in the city.

Perhaps more importantly, the appearance of the Observatory in Man Ray’s painting reveals the way in which Surrealist artists mined their everyday experiences as a means to supplement some greater exploration of the unconscious mind. In an earlier passage from his autobiography, Man Ray described the thrill of wandering through the city. He wrote, “I...wandered aimlessly through the streets of Paris, familiarizing myself with the transportation facilities of buses and subways. The city fascinated me, even the most sordid quarters seemed picturesque.”¹⁹⁸ His association of the Observatory and a woman’s breasts certainly suggests deeper sexual meaning and associations—an

¹⁹⁷ Man Ray, *Self Portrait*, 207.

¹⁹⁸ Man Ray, *Self Portrait*, 94.

iconography that is well beyond the aims of this study. And yet, the conflation of the two images remains as evidence of Man Ray's own "little Universe" on the streets of Montparnasse.

ASTRONOMICAL POINTS OF ACCESS: THE PALAIS DE LA DÉCOUVERTE AND INTERACTIVE EXHIBITION TACTICS

Opening on May 24, 1937 in conjunction with the Exposition Internationale des Arts et Techniques dans la Vie Moderne in Paris, the Palais de la Découverte, or Palace of Discovery, was an immediate success. By September 1937, almost one million visitors had been to the site; one month later that number doubled, and two million local and international visitors had experienced Paris' new science museum.¹⁹⁹ Originally designed as a temporary installation, enthusiastic public support and the passion of organizers such as Nobel Laureate Jean Perrin led to the museum's eventual establishment as a permanent attraction in Paris. The Palais de la Découverte was a new type of institution, differentiated from sites such as the previously mentioned Conservatoire des Arts-et-Métiers. In the words of Astronomy section chair, Robert Lencement, this new museum was an "active laboratory" that hoped to highlight both a historic foundation for contemporary scientific practice and the latest international

¹⁹⁹ André Léveillé. *Les Musées scientifiques, techniques, de la santé, planetaria, et la popularisation de la science*. (Paris: Conseil International des Musées, 1948), 16.

findings in a variety of fields.²⁰⁰ The very choice in nomenclature suggested such an emphasis. Other early names for the site included Palais de la Recherche and Palace de la Science.²⁰¹ By choosing to name the site the Palais de la Découverte, organizers honed in on science as an action, a process of passionate discovery. Moreover, the site moved beyond traditional museum tactics of retrospect and didactic display. Instead, visitors became active participants in the world of science.

This new museum was one of the first of its kind and marked an important shift toward interactive science display. This distinction was noted in early reviews of the institution but has been largely forgotten by more modern historians of science museums. The site, though, deserves recognition as a key contributor in the evolution of scientific museums and their continued efforts to engage popular audiences. While the Palais de la Découverte addressed all areas of the sciences, the exhibition halls devoted to astronomy were of particular note and helped to reignite public interest in a field that some saw as increasingly mathematical and inaccessible in the wake of Einstein's astrophysics. As a result, the museum served as one further means of encouraging public interest in astronomy.

Surrealists also visited the new museum. Painter Gordon Onslow Ford, one of several young artists that had joined the movement during the 1930s, recalled that both he

²⁰⁰ Robert Lencement, "Astronomy at the Palace of Discovery in Paris." *Popular Astronomy* 48 (December 1940): 188.

²⁰¹ Jacqueline Eidelman. "The Cathedral of French Science: The Early Years of the 'Palais de la Découverte'." in *Expository Science: Forms and Functions of Popularisation*. ed. Terry Shinn and Richard Whitley (Boston: D. Reidel Publishing Company, 1985), 199.

and fellow Surrealist Matta were impressed by the various objects and images in the collection, including the “photographs of things invisible to the naked eye.”²⁰² Others may have encountered displays at the Palais de la Découverte through their connections to the painter Lucien Coutaud. As a young painter in the 1920s, Coutaud had been a devotee of early Surrealist paintings by Ernst and the metaphysical works of Giorgio de Chirico.²⁰³ While he never fully joined the group, many critics noted the visual similarities between his works and those of the Surrealists. He also showed in a number of gallery exhibitions with major Surrealist artists.²⁰⁴ Coutaud was commissioned to complete one of the 31 painted murals at the Palais.²⁰⁵ No longer extant, the mural was originally located in a gallery dedicated to Chemical Agriculture. Little else survives in the existing literature regarding visual descriptions or reproductions of the work.

²⁰² Gordon Onslow-Ford, *Towards a New Subject in Painting: In Conjunction with an Exhibition of Paintings by Gordon Onslow-Ford, November 9, to December 12, 1948* (San Francisco: The San Francisco Museum of Art, 1948), 12. In his recollection of the exhibits, Onslow-Ford also mentions his interest in the museum’s mathematical displays and objects as well as an unnamed text on biological morphologies.

²⁰³ André Parinaud, “Entretien Lucien Coutaud: le reve, l’erotisme, et la mort,” *Galerie-Jardin Des Arts* 137 (May 1974): 50-51.

²⁰⁴ From the later 1930s onward, Coutaud often showed his work in many of the same galleries as major Surrealist artists and participated in other creative projects with members. In late 1937, he provided illustrations for a newly published version of Alfred Jarry’s plays, which also included essays and illustrations by Breton, Benjamin Péret, Pierre Mabille, Paalen, Tanguy, Man Ray, and Miró. In 1955, Coutaud would show his work in a June 1955 gallery show dedicated to the recently deceased Yves Tanguy (*Homage to Yves Tanguy* at Galerie Rive Gauche) alongside artists such as Ernst, Miró, Man Ray, and Tanning. See Durozoi, *History of the Surrealist Movement*, 337, 561, and 625.

²⁰⁵ Blantine Chavanne and Christiane Guttinger, “La Peinture Décorative” in *Cinquantenaire de l’exposition internationale des arts et des techniques dans la vie moderne*, ed. Bernard Lemoine (Paris: Institut Français d’Architecture and Paris-Musées, 1987), 364-391. Coutaud was one of 20 commissioned artists that completed work at the museum. Of the 31 murals executed for the opening of the site, only eight survive and have been conserved. This includes the still extant *Transport des forces* in the Earth Sciences and Physics wing completed by Cubist/Purist painter Fernand Léger.

However, given his body of work, it might well be that Coutaud, if only in a small way, brought a bit of the surreal into the halls of the museum.

The Surrealists were also involved in other events during the 1937 Exposition Internationale. Both Joan Miró and Alexander Calder completed commissioned art for fair pavilions.²⁰⁶ In letters to his gallerist Pierre Matisse from 1937, Miró mentions his recent completion of a monumental painting for the Spanish pavilion at the fair.²⁰⁷ The large painting, which, as the artist described it, depicted a portrait of a Catalan peasant reaping wheat in the fields, hung alongside Picasso's *Guernica* at the pavilion. Now lost, there are also no photographic reproductions of the work in situ. Calder designed a fountain for the courtyard with flowing liquid mercury rather than water, also located at the Spanish pavilion and not preserved.²⁰⁸

At other venues associated with the fairgrounds, Breton and Paul Eluard both gave lectures, and a group of Surrealists collaborated to stage two plays by Alfred Jarry.²⁰⁹ Moreover, thirty-eight Surrealist works were shown at the fair in an exhibition at

²⁰⁶ While Calder never signed any of the Surrealist manifestoes and never fully considered himself a part of the group, he was closely associated with a number of the artists—with especially close long term friendships with Breton and Miró—and showed work in both the 1936 and 1947 Surrealist exhibitions. See Mark Rosenthal, *The Surreal Calder* (Houston: The Menil Foundation, Inc., 2005), 12-15.

²⁰⁷ Margit Rowell, ed. *Joan Miró: Select Writings and Interviews* (Boston: G. K. Hall & Co., 1986), 156-159.

²⁰⁸ Lipman, *Calder's Universe*, 28; and Nigel Simeone, "Music at the 1937 Paris Exposition: The Science of Enchantment," *The Musical Times* 143 (Spring 2002): 10.

²⁰⁹ Steven Harris, *Surrealist Art and Thought in the 1930s: Art, Politics, and the Psyche* (New York: Cambridge University Press, 2004), 221.

the Musée de Jeu de Paume.²¹⁰ The fair's Pavillon de l'Élégance was also regularly described in the press as a Surrealist-inspired presentation of the latest in couture fashion.²¹¹ While the designers that produced the design for the pavilion were not associated with Surrealism, press and documentary photos of the space were produced by Wols, a German born photographer and painter who was associated with the group.²¹² Wols' images stressed the uncanny nature of space, documenting the strangely-designed, cave-like plaster walls of the pavilion and making the oversized mannequins seem disjointed and dramatic. Many scholars link the later use of mannequins at the 1938 International Exposition of Surrealism to the headless mannequins used at the fashion pavilion the previous year.

Given the widespread and varied involvement of Surrealists with activities and venues associated with the 1937 Exposition and the evidence of at least one member's visit to the Palais de la Découverte, this new science museum would have most certainly

²¹⁰ Harris, *Surrealist Art and Thought in the 1930s*, 221-224. Many Surrealists were disappointed in the exhibition's assertion that all French modernist painting had its roots in the avant-garde tactics of Cubism. Moreover, the exhibition over-simplified Surrealism by explaining the movement as paintings of dreams and not making mention of their reliance on Freudian psychology and other cultural sources.

²¹¹ For more on the Surrealist connection to the design of the Pavillon de l'Élégance see Alyce Mahon, *Surrealism and the Politics of Eros, 1938-1968* (New York: Thames and Hudson, 2005), 32-33; and Ghislaine Wood, *The Surreal Body: Fetish and Fashion* (London: V&A Publications, 2007), 18-25. As Wood notes, a reporter for the *London Bystander* called the space "the crystallization of Surrealism." See Wood, *The Surreal Body*, 18.

²¹² Wols was the pseudonym of Alfred Otto Wolfgang Schulze. He was also later associated with post-war European abstraction as a pioneer in Art Informel and Tachism. The photographs Wols produced for the Pavillon de l'Élégance were some of his first photographic works to gain widespread attention; they were published in fashion magazines such as *Vogue* and *Harper's Bazaar*, as well as *Revue de l'Art*. For more on Wols' biography, his links to Surrealism, and his photography, see Christine Mehring, *Wols: Photographs* (Cambridge, MA: Busch-Reisinger Museum, 1999); Wols and Werner Haftmann, *Wols: Watercolors, Drawings, Writings* (New York: H. N. Abrams, 1965); and Wols, *Circus Wols: the Life and Work of Wolfgang Schulze* (Todmorden, UK: Arc Publications, 1978).

been on the radar of Surrealist artists fascinated by science. Thus, the Palais de la Découverte should be considered as another point of informational access for Surrealist artists interested in exploring astronomical topics. Moreover, the site served an important role in the popularization of scientific concerns amongst the broader French public and was especially successful in making astronomy more accessible and understandable to a lay audience.

The Palais de la Découverte was not a part of the original fair plans. Rather, it was the pet project of Jean Perrin.²¹³ Perrin, a French physicist, was awarded the Nobel in 1926 following the publication of his experimental confirmation of Einstein's work on Brownian motion and the atomic structure of matter. By the early 1930s, Perrin was disappointed in not only the French education system's poor science curriculum but also the lack of governmental support for French experimental science. In 1936 he formed the CNRS or National Center for Scientific Research, which sought to provide institutional reform for French science both in laboratories and the classroom.²¹⁴ As early as 1934, prior to governmental support for the CNRS, Perrin had also signed on to organize a new museum that would stress the importance of experimental science in France. He hoped

²¹³ For a well-researched biography of Perrin focused on his contributions to the sciences, see Mary Jo Nye, *Molecular Reality: A Perspective on the Scientific Work of Jean Perrin* (New York: American Elsevier Inc., 1972). See also Mary Jo Nye, "Science and Socialism: The Case of Jean Perrin in the Third Republic," *French Historical Studies*, 9 (Spring 1975): 141-169.

²¹⁴ Eidelman, "The Cathedral of French Science," 196.

that this new institution might excite the young people of France about the possibilities of scientific research and inspire them to pursue careers in the field.²¹⁵

Perrin and his colleagues aimed to create an institution for science that, depending on public response, might see life after the conclusion of the exposition. This success would in part be encouraged by the unique curatorial practices and choices of these men as they planned for the Palais de la Découverte. The organizers' ideal museum would move beyond the display tactics and focus of the existing science museums in Paris, the Conservatoire des Arts et Métiers and the Jardin des Plantes.²¹⁶ Whereas these earlier institutions provided a historical and almost encyclopedic cataloguing of the development of scientific practices via a static, chronological presentation of the tools and objects of scientific practice, Perrin and other organizers at the Palais de la Découverte hoped not only to elucidate the history of scientific practice but also to emphasize contemporary findings and to provide hands-on educational opportunities for visitors.

²¹⁵ Nye, *Molecular Reality*, 57.

²¹⁶ Arts et Métiers originally functioned not only as a depository for scientific apparatuses but also as a teaching institution, which organizers hoped might encourage industrial development in France. However, by the beginning of the twentieth century, the site served almost solely as a traditional museum of display, wherein scientific equipment was organized chronologically and by type in vitrines and other static display cases. Thus, the site documented technological progress rather than scientific discovery, and little effort was made to engage visitors or demonstrate the scientific findings made possible by the equipment on display. While some public lectures were available at the Jardin de Plantes, the museum still relied upon an encyclopedic classification of specimens arranged in vitrines that allowed for little interaction. For more on these early Paris science museums, their display tactics, and their goals and aims, see Silvio A. Bedini, "The Evolution of Science Museums," *Technology and Culture* 6 (Winter 1965): 1-29; Bernard Blache, "A Palace to Reconcile Man and Science," *Museum International* 52 (2000): 43-47; Charles Earle, "Instruction in Natural History at the Jardin des Plantes, Paris," *Science* 4 (July 17, 1896): 65-67; and Miriam R. Levin, "The City as a Museum of Technology," In *Industrial Society and its Museums, 1890-1990*, Edited by B. Schroeder-Gudehus (Langhorne, PA: Harwood Academic Publishers, 1993), 27-36.

For Perrin, the visitor's experience at the Palais was of prime importance; he felt that scientific education happened most effectively via activities that mimicked the work of actual scientists and placed greater value on experimentation rather than theory.²¹⁷ As a result, the museum equated interactive display tactics with the experimental procedures of scientific discovery and innovation. Perrin was also particularly attuned to the needs of a public hungry for scientific knowledge but often lacking formal knowledge in science; he understood that his displays needed to be adjusted to meet the needs of a specific audience.²¹⁸ In order to best capture the imagination of his audience, the museum was designed as a fully interactive experience and visitors were encouraged to touch, view, and even see scientific information in new ways.²¹⁹ As Robert Lencement, organizer of the Astronomy galleries, noted,

The Palace of Discovery is not a museum where objects and precious instruments have been assembled in order to preserve them intact, and placed in that immobility which is the condition of their conservation. Rather it is a vast and active laboratory. The apparatus which is to be found here is not meant for the curious of future generations. It is there to function, to be used before the visitors, or in their own hands, under the direction of Palace specialists.²²⁰

As in many modern day exploratoriums and science centers, visitors at the Palais de la Découverte assisted demonstrators and used apparatuses and equipment, taking on the

²¹⁷ Eidelman, "The Cathedral of French Science," 197.

²¹⁸ Blache, "A Palace to Reconcile Man and Science," 45.

²¹⁹ Eidelman suggests that the Palais de la Découverte may have been one of the first museums to actively encourage visitors to touch displays and use push-button mechanisms to activate display tactics. See Jacqueline Eidelman, "Culture scientifique et professionalization de la recherche: la création du Palais de la Découverte à la fin des années trente," in *Vulgariser la science: le processus de l'ignorance*, ed. Daniel Jacobi and Bernard Schiele (Seyssel, FR: Éditions Champ Vallon, 1988), 178.

²²⁰ Lencement, "Astronomy at the Palace of Discovery in Paris," 188.

momentary role of the scientist. As a result the museum became a didactic learning space for active viewer engagement.

The museum also sought to engage visitors in new ways by relying on more traditional tactics of spectacle, quite common to other International Expositions. Upon entering the main hall of the Palais, visitors were thrust into a world of fantastic and awe-inducing scientific display. The towering space of the central vestibule was lit with blue electric lighting provoking a sense of theatrical wonder in visitors. In the center of the space stood two huge Van de Graaff generators, which stood nearly 14 meters high and, according to press reports, had the capability of producing 5 million volts of electricity.²²¹ As author R. Chenevier noted in a review in a May 1937 issue of *L'Illustration*, “nothing may be more expressive of the mystery power ruling a great deal of the modern world activity than the electrostatic machine realized...”²²² This theatrical display made science lively, impressive, and engaging. While this spectacular, staged attraction pandered to crowds looking for visual entertainment, Perrin still saw value in drawing in

²²¹ Philippe Molinié and Soraya Boudia, “Exhibiting Sparks of Big Science to the Public: Electrostatics, Atomic Machines, and Experience of Paris Palais de la Découverte,” *IEEE Transactions on Dielectrics and Electrical Insulation* 16 (June 2009): 755-757. Molinié and Boudia argue that the generator was only capable of routinely generating between 2-3 MV of potential energy between the two spheres despite popular claims of a greater output. Press reports from the era billed the device as the largest and most powerful electrostatic machine in the world. In actuality, the device was a copy of an earlier American model, which, while taller than this earlier prototype, was no more powerful or impressive than other machines seen outside Paris. Molinié and Boudia contend that it was the popular success of this spectacle that helped Perrin later convince the French government to maintain the Palais de la Découverte as more than a temporary site. Sadly, war-time financial difficulties made it unfeasible to maintain the machine and the generators were dismantled in 1942. For further descriptions of the site’s electrostatic machine, see also Bertrand Lemoine, “La Technique médiatisée,” in *Cinquantenaire de l’Exposition Internationale des Arts et des Techniques dans la Vie Moderne*, ed. Bertrand Lemoine (Paris: Institut Français d’Architecture and Paris-Musées, 1987), 465.

²²² R. Chenevier, “La science à l’Exposition,” *L’Illustration* 197 (May 1937). Translation found in Molinié and Boudia, “Exhibiting Sparks of Big Science to the Public,” 756.

these visitors. He firmly believed that such popularization efforts did not compromise the scientific import of the museum's larger effort to excite and educate visitors.²²³

After their initial encounter with the Van de Graaff generators, visitors continued through the museum and were exposed to displays and experiments from 6 major scientific fields: Astronomy, Mathematics, Physics, Chemistry, Biology and Medicine.²²⁴ Each section provided historical background, but emphasis was placed upon contemporary experimental knowledge. In a further effort to create an interactive environment, the museum hired demonstrators who were both knowledgeable and had an aptitude for public presentations.²²⁵ This cast of young scientists aided in the museum's goal of visualizing the laboratory work of scientists in a given field in a way that was both appealing and understandable for all audiences.²²⁶ In addition to live demonstrations, organizers relied on other tactics for viewer interaction. Most notably, very few areas included vitrines and other encasements that prohibited close observation. Other exhibits featured push buttons that would set an apparatus in motion, and text

²²³ Eidelman, "The Cathedral of French Science," 205.

²²⁴ Each major section was designed and supervised by a committee of French scientists, most hand-picked by Perrin. Each committee was tasked with choosing appropriate experiments for display and seeking out new means to visualize scientific content.

²²⁵ Many of these demonstrators were young university science students. See Lèveillé, *Les Musées Scientifiques*, 19. See also Kenneth Hudson, *Museums of Influence* (New York: Cambridge University Press, 1987), 106.

²²⁶ For example, in the Optics gallery, visitors watched experiments showing the diffraction and polarization of light as a means to visually confirm the wave theory of light. Exhibition designers were also adept at encouraging participation, even when an area of the sciences, such as mathematics, was not well suited for interactive demonstrations. Here, organizers used film presentations and included huge blackboards on the walls with problem sets, which visitors could try to solve with the aid of demonstrators. See Pierre Biquard, "The Palace of Discovery at the Paris International Exhibition, 1937," *Nature* 140 (August 21, 1937): 328.

panels were kept to a minimum.²²⁷ As a result, the Palais de la Découverte made science come alive for visitors, regardless of their level of education or experience.

Organizing the museum's astronomy section was no easy feat. As one reviewer of the Palais expressed in a 1937 issue of the magazine *Nature*, "The task undertaken by those responsible for the astronomy section has been no small one. They have had to crowd into a few rooms all that is known about the universe, so vast that light takes a thousand million years to traverse it."²²⁸ Perrin initially chose Ernst Esclangon, then director of the Paris and Meudon Observatories, to oversee the galleries. Esclangon would later delegate much of the work to the aforementioned Robert Lencement. In his review of the astronomy galleries, translated and published in the American periodical *Popular Astronomy* in 1940, Lencement expressed many of the challenges and difficulties he faced in creating the exhibition spaces; he bemoaned the fact that astronomy had little place in contemporary French education and that many found the field too complex or daunting. He wrote, "...For the uninitiated, astronomy has the reputation of being inaccessible, like higher mathematics, and it is not uncommon to hear cultivated people say 'it is much too difficult for me; I could never understand a thing

²²⁷ One especially innovative and inventive display used taxidermied chickens to demonstrate Mendel's laws of genetic inheritance. Because the chickens were arranged on a pyramidal, three-dimensional display, viewers were forced to move around the object, thereby placing special emphasis on the step-by-step process of scientific evaluation and discovery.

²²⁸ Biquard, "The Palace of Discovery at the Paris International Exhibition, 1937," 328.

about it.”²²⁹ Instead, Lencement chose to “put aside the mathematical element” and instead focus on the awe and wonder the universe could inspire in viewers.²³⁰

Astronomy was given a prominent location in the Palais; after the initial surprise of the electrostatic display, visitors would have noticed the grand staircase off the main hall leading to the Astronomy wing. A sparkling, shooting star was placed just over the words “Astronomie” and set the tone for the fantastic images viewers would soon encounter. Experimental demonstrations were rarely used in the astronomy wing. As Lencement noted in his review, he was forced to “acknowledge the handicap of the astronomy section compared to other sciences in terms of performable experiments.”²³¹ Because of its location in the heart of the city, it was difficult to install a telescope with optimal viewing. The size of such instruments was also problematic. Instead, visitors were allowed to examine and interact with smaller telescopes, and in a room dedicated to an exploration of the sun, a “vertical lens, objective 33 cm” was arranged that would, in optimal weather conditions, project a large image of the sun on a screen. Large-scale models also helped visitors better visualize the vastness of the universe. In one room,

²²⁹ Lencement, “Astronomy at the Palace of Discovery in Paris,” 189.

²³⁰ Lencement, “Astronomy at the Palace of Discovery in Paris,” 189-190. It is interesting to note that Lencement, in his dismissal of the dry mathematics of contemporary astronomy, also was quick to emphasize that his displays and exhibition choices all hoped to maintain a level of rigorous scientific accuracy that was, as he termed it, “far from all fantasy.” Here it seems Lencement recognized the fact that many astronomy enthusiasts gleaned their information from science fiction and other fantastic source materials. In this same passage, Lencement remarked, “...astronomy [has become] more of an article of faith than an exact science. People either admiringly believe all that the astronomers profess to have found out, or smile indulgently at them.” As a result, he was dedicated to tackling public misconceptions of the astronomical field, while at the same time representing the wonders of contemporary research in astronomy.

²³¹ Lencement, “Astronomy at the Palace of Discovery in Paris,” 190.

visitors saw up close a large maquette of the lunar surface based on recent photographs taken at the Mount Wilson Observatory near Los Angeles.²³² In another room, visitors encountered a model that helped to explain the abstract concept of light years with scaled representations of the vast distances between known planetary and galactic bodies in the universe.²³³ The Astronomical galleries also used films and lectures to help explain phenomena and scientist attendants would often also refer visitors to interactive displays for other related fields such as physics and optics.

Aside from these tactics, organizers of the Astronomy galleries best engaged visitors by including large scale photographs of astronomical phenomena throughout the galleries. As Lencement noted, “The large development of knowledge of the universe in the last twenty or thirty years has been illustrated by the most striking visual documents.”²³⁴ Thus it only made sense to show these images to the public. Relying on the latest technology in telescopes and astronomical photography, the walls were filled with images of planetary bodies, galaxies, comets, and other stellar phenomena. Lencement and other organizers invited participation from observatories worldwide and the exhibition spaces featured images from observatories as far away as Mexico and

²³² Gilles Plum, “Le Palais de la Découverte et le Grand Palais,” in *Cinquantenaire de l’Exposition Internationale des Arts et des Techniques dans la Vie Moderne*, ed. Bernard Lemoine (Paris: Institut Français d’Architecture and Paris-Musées, 1987), 297.

²³³ Biquard’s description of the model: “Three models show the structure of portions of space of decreasing sizes: the first represents the galaxy the diameter of which is of the order of five million light years; the second shows the sun and the twenty-five stars surrounding it in a portion of space through which light travels in twenty-five years; finally, the third model shows the sun and its attendant planets, that is, a very small space through which lights travels in seventeen hours.” See Biquard, “The Palace of Discovery at the Paris International Exhibition, 1937,” 328.

²³⁴ Lencement, “Astronomy at the Palace of Discovery in Paris,” 190.

South Africa.²³⁵ Special care also was taken in the curatorial decisions that determined the ways in which these images were staged within the galleries as well as how they were reproduced. For example, Lencement recalls the attention given to lighting choices. In a room that explored the stellar universe, light levels were lowered to relative darkness and photographs were lit with specially designed blue-tinted lights as a means to give off a more encompassing experience of viewing the night sky and effectively thrusting visitors into the star-lit environment of intergalactic space.²³⁶ In addition to these lighting decisions, organizers also thought about the size of photographic reproductions, choosing to blow up images and render the cosmos on a grand scale. According to Lencement,

It is somewhat paradoxical to illustrate astronomy, the science of the immense, on very small documents. A photograph such as the one of the moon or the spiral nebula taken with the Hooker telescope of Mount Wilson, which the visitor would have passed by without even noticing, becomes for him a veritable revelation when he sees it enlarged on several square meters, and presented under appropriate lighting.²³⁷

Lencement also fought for the inclusion of a small room devoted to the field of astronautics, a space that featured a number of lectures on the possibilities of future

²³⁵ Lencement includes a partial list of participant observatories listing the following countries: Austria, Belgium, Canada, Czechoslovakia, Egypt, England, France, Germany, Great Lebanon, Holland, Italy, Mexico, Norway, South Africa, Sweden, the United States and the USSR. See Lencement, "Astronomy at the Palace of Discovery in Paris," 191.

²³⁶ Lencement, "Astronomy at the Palace of Discovery in Paris," 191-192. The author also mentions that special "white-yellowish light" was used in the sun room to evoke the solar surface. The Stellar Universe gallery also featured a group of models, painted in fluorescent models, illuminated with an ultraviolet light that helped depict galaxy formation.

²³⁷ Lencement, "Astronomy at the Palace of Discovery in Paris," 190.

interplanetary travel.²³⁸ Here, space exploration, which many popular audience members would have encountered in science fiction sources, was treated academically and space travel was framed in a scientific context. In some respects, Lencement showed that space exploration, rocketry, and associated technologies were a plausible pursuit and one of the next important steps in the field of astronomy. His choice to include such displays is also suggestive of the greater cosmic voyage that organizers hoped visitors would embark upon as they moved through the galleries and saw the universe in new and exciting ways.

In total, the gallery spaces devoted to astronomy at the Palais de la Découverte featured some 350 photographs, 160 diagrams and other images, and 40 models and observational instruments.²³⁹ Whenever possible, these galleries stressed the type of interactive learning environment seen elsewhere in the museum. More importantly, Lencement and others involved in creating the galleries thought about the curation of this space not only in terms of the collection of data to be highlighted, but also in terms of creating an experiential environment that helped transport viewers to the starry expanses of the heavens, exposing them to the beauty of the cosmos and instilling in them a sense of wonder with regards to the universe. Largely absent were the perplexing equations of Einstein and recent work in astrophysics. Instead, the space was filled with inspiring and awe inducing imagery, the stuff we humans can peer at in the night sky only rendered on an impressive scale and explained in accessible terms.

²³⁸ Philip Ellaby Cleator, *Into Space*, (London: Allen & Unwin, 1953), 24. See also Lencement, "Astronomy at the Palace of Discovery in Paris," 193.

²³⁹ Lencement, "Astronomy at the Palace of Discovery in Paris," 192.

Complementing these displays, the fair also offered visitors another means to visually encounter the heavens with the addition of a Zeiss planetarium on the fairgrounds. The 1937 exposition marked the first time Parisians were able to experience this new technology. The projector was not housed at the Palais de la Découverte, but was instead installed in a temporary structure, only a few hundred meters from the nearby Grand Palais.²⁴⁰ Initial visits to the site were high; on opening day—May 5th—all hourly showings were sold out in a viewing space that could hold approximately 355 visitors.²⁴¹

In conjunction with the astronomical displays at the Palais de la Découverte, the planetarium helped engage and inspire fair visitors with regard to the cosmos.²⁴²

²⁴⁰ Gérard Oudenot, “Histoire des planétariums,” in *La Science en scène*, ed. Michel Demazure and Michèle Brédimas (Paris: Presse de l’École Normale Supérieure et Plais de la Découverte, 1996), 146. Another source lists the exact location as “sur le cours Albert 1er, entre les ponts des Invalides et de l’Alma.” See Lucien Tartoïs, “Le Premier Planétarium de France 1937-1979,” *Revue du Palais de la Découverte: Le Planétarium, Numéro special* 37 (June 1990): 6. For another brief history of the planetarium, see also Paul Corderc, *Le Planétarium du Palais de la Découverte* (Paris: Université de Paris, 1952).

²⁴¹ Oudenot, “Histoire des Planétariums,” 146; and Tartoïs, “Le Premier Planétarium de France 1937-1979,” 6.

²⁴² Due in part to the temporary structure erected for viewing, the planetarium closed in November 1937 along with the rest of the fair’s temporary exhibit halls. While the Palais de la Découverte was initially able to secure government funding and support to keep the museum open after the conclusion of the fair, economic factors—related in part to World War II and other major international events—did not allow the continuation of planetarium programming during the later 1930s and 1940s. At one point the government sponsored Société des Parcs d’Attractions attempted to sell the Zeiss projection equipment, but one can assume these efforts failed, as the projector was eventually stored at Arts et Métier during the war years. A sales listing for the projection equipment appears in a 1938 issue of the *The Science News-Letter* published by the Washington D.C. based organization the Society for Science and the Public. The listing stressed that “any person...may have the opportunity” to purchase the device in an October 1938 auction in Paris. The announcement also highlights that the projector will be liquidated, with bidding to start at 50,000 francs (or around \$1500)—a bargain compared to contemporary prices for new projectors, which the article lists at \$125,000. See “Paris Planetarium to be Sold at Auction,” *The Science New-Letter* 34 (September 3, 1938): 153. In June 1952 planetarium showings began again at the Grand Palais, under the direction of museum officials at the Palais de la Découverte. Showings continued through April 1979, when problems with the projector prompted museum officials to erect a new auditorium with newly manufactured projection equipment.

Drawing a direct link between the exhibitionary practices at the Palais de la Découverte and subsequent Surrealist exhibitions is largely impossible. However, the Surrealists in charge of organizing the 1938 International Exposition of Surrealism similarly sought to disrupt traditional museum and display practices by insisting on viewer interaction.²⁴³ Perrin and the Surrealists had vastly different goals in mind when they embarked upon such efforts, but their use of similar display tactics, rarely used before the time, certainly deserves mention. Both venues featured a similar focus on interaction and installation that would also be utilized in all subsequent major exhibitions of Surrealist art for the next two decades as well as similar efforts to revitalize science museums, both in France and abroad.

The Exposition Internationale du Surréalisme opened at 10:00 pm on Monday, January 17, 1938. Held at the Galerie Beaux-Arts on Rue du Faubourg Saint-Honoré, located in the eighth arrondissement near the fashionable Avenue des Champs Élysées, the exhibition attracted a far wealthier, elite clientele not often seen at Surrealist gallery openings.²⁴⁴ What these crowds met with, upon entering the transformed space of the

²⁴³ Alyce Mahon provides one of the most comprehensive works of scholarship on the events of the 1938 exhibition. See Mahon, *Surrealism and the Politics of Eros*, 23-63. Equally useful and detailed is the work of scholar Bruce Altshuler and his text on the evolution of avant-garde exhibition tactics. See Bruce Altshuler, *The Avant-Garde in Exhibition: New Art in the Twentieth Century* (Berkeley: University of California Press, 1994). The other often cited source on this exhibition is a text by scholar Lewis Kachur. Because his focus is primarily on the efforts of Dali and Duchamp in major Surrealist exhibitions, his account is largely unremarkable and provides little new information not available in either Mahon or Altshuler's accounts. See Lewis Kachur, *Displaying the Marvelous: Marcel Duchamp, Salvador Dali, and Surrealist Exhibition Installations* (Cambridge, MA: The MIT Press, 2003).

²⁴⁴ Mahon, *Surrealism and the Politics of Eros*, 35-37. Gallery owner Georges Wildenstein usually featured more traditional, far less avant-garde affairs, which attracted this audience. Mahon notes that the show that preceded the Surrealist opening was a display of works by Spanish Renaissance luminary El

gallery, would surprise, frustrate, and even frighten visitors. It was perhaps unlike any other art opening they had attended in Paris. The Surrealist organizers of the exhibition sought to shake up and enliven display tactics and the use of the gallery in exhibition practices. As artist Man Ray recalls, the organizers hoped to “destroy the clean, clinical atmosphere generally seen in the most modern of exhibitions.”²⁴⁵

A number of key contributors to the Surrealist movement joined together to organize the exhibition. While Breton was listed as the show’s organizer in most press accounts, Duchamp likely generated many of the non-traditional tactics used in the gallery. In the exhibition catalog, he was listed as the *Générateur-Arbitre* (Producer-Referee).²⁴⁶ Duchamp was assisted by “Special Advisors” Dali and Ernst; Wolfgang Paalen, who was in charge—as listed in the catalog—of “water and underbrush;” and Man Ray, who assisted with lighting concerns.²⁴⁷ Together, these men transformed the Galerie Beaux-Arts into a total sensory experience.

Under the direction of Man Ray, visitors on opening night were given flashlights and then told to proceed into the pitch dark gallery. They were forced to find their way through a confusing maze of sculptural pieces, live plants, and the other visitors, all the

Greco. Altshuler notes that many of those invited to the late night affair chose not to arrive until around 11:00 pm, by which time Parisian police officers had blocked off the entrance due to the sheer number of attendees already in the gallery. Revelers and visitors then spilled into a neighboring furniture store—in part to see Dali’s red, lip-shaped sofa—and were later admitted just after midnight. See Altshuler, *The Avant-Garde in Exhibition*, 124.

²⁴⁵ Man Ray, *Self Portrait*, 232.

²⁴⁶ Altshuler, *The Avant-Garde in Exhibition*, 124; and Mahon, *Surrealism and the Politics of Eros*, 35.

²⁴⁷ Mahon, *Surrealism and the Politics of Eros*, 35.

while looking at the art on display.²⁴⁸ While visitors experienced visual deprivation, their other senses were heightened. A hidden phonograph filled the space with the screams and laughter of asylum residents and German military music. Guests also met with an olfactory assault. Benjamin Perét installed a small coffee roaster which filled the air with the scent of Brazilian coffee. The sounds, smells, and compromised viewing conditions all provided visitors with an experience that was anything but typical.

Duchamp and other organizers also looked to completely transform the space of the gallery into a strange grotto of Surrealist encounters. In the gallery's entry, Salvador Dali's absurd installation *Rainy Taxi* set the tone for the oddly configured spaces of the gallery's interior rooms.²⁴⁹ Visitors then continued through a small hallway, the rue Surréaliste. Here stood seventeen mannequins, all of whom were outfitted by contributors to the exhibition and stood before blue enamel street signs. While some of the signs designated actual locations in the city of the Paris of note to the Surrealists, others were fantastic new streets invented for the city. Here the Surrealists would further

²⁴⁸ According to Altshuler, Duchamp had originally hoped to construct electric sensors near each painting on display that would only trigger a small spotlight when a viewer approached closely, leaving the rest of the gallery in darkness. Man Ray provided the alternate plan for small, hand-held flashlights when this idea proved too difficult to realize. After opening night, almost all of the flashlights turned up missing. In his autobiography, Man Ray recounts that the loss of the flashlights was regrettable since they had been rented. He remarked, "If I had thought of it, I'd have had [the flashlights] marked and sold as souvenirs, of the Surrealist Exhibition of 1938, Paris." After the opening, Man Ray built small, hidden light fixtures that maintained the rather eerie intentions of the organizers but also lit works of art for viewing, appeasing both visitors and many of the artists, who on opening night were frustrated by the compromised viewing conditions. See Altshuler, *The Avant-Garde in Exhibition*, 123-124; and Man Ray, *Self Portrait*, 232-233.

²⁴⁹ This work was composed of a full-size Paris taxi cab, complete with driver and passenger. In the backseat sat a blonde mannequin in an evening gown. Her driver, a shark-headed man wearing goggles, sat poised at the wheel. Throughout the interior of the taxi, lettuce leaves were strewn and live snails crept about, devouring this sustenance. Dali also rigged a series of tubes so that rain constantly fell within the cab's interior.

enforce the idea, previously discussed, of a Surrealist Paris and the city's streets as a location for Surrealist creative endeavors and exploration.

In the gallery's main rooms, Duchamp and his compatriots best succeeded at disrupting visitor's expectations. While some paintings were arranged on the walls—typical of a gallery exhibition space—a series of revolving door panels, which had been engineered by Duchamp, featured smaller drawings and graphic work.²⁵⁰ Sculptural work and Surrealist objects were also scattered about in strange combination. Paalen arranged dead leaves and live plants throughout the space, even constructing a small pond in one corner of the gallery. Duchamp placed a charcoal brazier at the center of the room and covered the ceiling of the space with 1200 coal sacks [Fig. 6].²⁵¹ Given Duchamp's extensive scientific knowledge and playful associations in all his projects, this may have been a sly astronomical reference to the “Coalsack” Nebula, an interstellar cloud located near the Southern Cross formation that is easily visible to the naked eye as a large dark patch in the Milky Way. With improvements in stellar and astronomical photography from the later nineteenth century onward, the resulting images made the general public increasingly aware of these interstellar features known as “coalsacks.”²⁵²

²⁵⁰ Pierre Cabanne, *Dialogues with Marcel Duchamp* (New York: Da Capo Press, 1987), 81.

²⁵¹ In an interview with Pierre Cabanne, Duchamp laughingly referred to problems with the galleries insurers regarding the fire threat of his plans for the brazier and coal sacks. Duchamp recalls that the sacks, which had formerly been used for transporting coal were emptied and stuffed with newspaper. Cabanne noted that the nearby pond could have also been used to extinguish any inadvertent fires. See Cabanne, *Dialogues with Marcel Duchamp*, 81.

²⁵² The dry plate photographic process of the later 1870s allowed scientists to begin to capture viable images of phenomena such as nebula. By the turn of the century, numerous images of spiral nebulae had been produced and widely published. See Dorrit Hoffleit, *Some Firsts in Astronomical Photography*

While the 1938 Surrealist Exhibition did not feature artists and exhibitors interacting with visitors like the Palais de la Découverte's use of scientist demonstrators, opening night festivities did feature one performance piece by a young Parisian dancer, Hélène Vanel, a recent acquaintance of Dali.²⁵³ Described by scholar Alice Mahon as a Proto-Happening, Vanel's performance of *Unconsummated Act* occurred, unannounced, at midnight on opening night.²⁵⁴ Vanel entered the gallery clothed only in a tattered night gown. She wailed, murmured, grunted, and gasped for air, all the while contorting her body. According to reports from attendees, Vanel gyrated on a bed, splashed about in Paalen's pond, and even wrestled with a live rooster.²⁵⁵ With only the recording of asylum laughter as an accompaniment, Vanel's act crescendoed to uncomfortable levels

(Cambridge, MA: Harvard College Observatory, 1950), 32; and Vaucoleurs, *Astronomical Photography*, 44 and 57. For more on the Victorian and later nineteenth-century fascination with nebula, see Schaffer, "On Astronomical Drawing," 441-474.

²⁵³ Biographical details on Vanel are sparse. During the early 1920s she studied under choreographer and pioneer of free dance techniques, Margaret Morris. Later in the decade, she established her own small, experimental dance troupe, Rhythm and Colour, in Nice with then partner Lois Hutton. In 1937, after dealing with personal issues with Hutton as well as increasing financial difficulties, Vanel discontinued her work with Rhythm and Colour and relocated to Paris, where she would meet Dali and other Surrealists. For the best account of both the dancer's life and her interaction with the Surrealists, see Don La Coss, "Hysterical Freedom: Surrealist Dance and Hélène Vanel's Faulty Functions," *Women & Performance: A Journal of Feminist Theory* 15 (2005): 37-61. See also Jacqueline Robinson, *Modern Dance in France: An Adventure, 1920-1970* (Amsterdam: Harwood Academic Publishers, 1997), 76-77; and Penelope Rosemont, ed. *Surrealist Women: An International Anthology* (Austin: The University of Texas Press, 1998), 112-113.

²⁵⁴ Mahon, *Surrealism and the Politics of Eros*, 54.

²⁵⁵ La Coss, "Hysterical Freedom," 42; and Mahon, *Surrealism and the Politics of Eros*, 52-54.

for many of the bourgeois visitors and further disrupted the traditional experience of the art gallery through such a shocking display.²⁵⁶

Some of the imaginative staging efforts used at the 1938 Exhibition of Surrealism, including the sounds, smells, and lighting choices already discussed, might be compared to the efforts of organizers at the Palais de la Découverte. Spectacle and interactive environments allowed both the Surrealists and Perrin and his compatriots to challenge traditional display practices, all the while making visitors want to know more about the works and ideas on display. As a part of a larger history of museum and gallery practices, both the 1938 Surrealist Exhibition and the displays at the Palais de la Découverte mark a transitional moment when curators and museum professionals began to think about new ways to engage and even surprise spectators in gallery and museum spaces and to use new unusual exhibition tactics.

Wandering the city's streets, the Surrealists had ready access to sites of astronomical import within Paris, whether in their exploration of the occult bookshops along Rue Saint-Jacques and the Boulevard Saint-Germain or the constant presence of the city's observatory, silently watching over their daily activities in Montparnasse. In the halls of the Palais de la Découverte, those artists most engaged with astronomy found a wealth of information on the cosmos. The history of astronomical popularization, already

²⁵⁶ Both La Coss and Mahon stress the link between Vanel's performance and hysteria in their analysis of the performance. See La Coss, "Hysterical Freedom," 37-61; and Mahon, *Surrealism and the Politics of Eros*, 52-55. For a discussion of Surrealism and its fascination with hysteria, see Lomas, *The Haunted Self*, 53-93.

established in Chapter One, and these modes of contact all helped engender the varied responses to the heavens analyzed in subsequent chapters.

Chapter 3

Cosmic Preoccupations: Joan Miró, Max Ernst, and Astronomy

The spectacle of the sky overwhelms me. I am overwhelmed when I see a crescent moon or the sun in an immense sky.—Joan Miró²⁵⁷

When strolling through the forests, fixing the eyes obstinately on the ground, you certainly discover many wonderful, splendid things. If then, all of a sudden, you turn your eyes upward, you are overwhelmed by the revelation of another equally wonderful world. The significance of suns, moons, constellations, nebulae, galaxies and space as a whole outside the earth zone have steadily taken root during the last century in human consciousness as well as in my work and will most probably remain there.—Max Ernst²⁵⁸

While Surrealism began as a movement dedicated primarily to new modes of poetic expression, visual artists associated with the group have produced its greatest popular and cultural legacy. First-generation Surrealists—including such luminaries as Max Ernst, André Masson, Joan Miró, Man Ray, and Yves Tanguy—reimagined psychic automatism, as outlined in Breton's first manifesto from 1924, to include a full range of visual automatic techniques and processes. While early Surrealist art production tended

²⁵⁷ Yvon Taillandier, "I Work Like a Gardener," in *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 247. This interview was originally published in *XXe siècle* 21 (February 15, 1959).

²⁵⁸ Taken from a 1969 note by Ernst reprinted in *Max Ernst Maximiliana: The Illegal Practice of Astronomy, Hommage à Dorothea Tanning*. This book, compiled by Peter Schamoni, features reproductions of works by Ernst that depict astronomical imagery as well as some of the images from the original *Maximiliana* released with Iliaszd. Schamoni also excerpts various interviews with Ernst. While there is no analysis or original scholarship included in the text, the visual compendium provided in this volume helped guide my study of Ernst and astronomy. See Peter Schamoni, *Max Ernst Maximiliana: The Illegal Practice of Astronomy, Hommage à Dorothea Tanning* (Boston: New York Graphic Society, 1974), 5.

to stress a reliance on these automatic practices, the subject matter of this work was diverse; however, one repeated motif was that of heavenly bodies and other cosmic themes. Among this early generation, both Ernst and Miró demonstrated a repeated borrowing from astronomical subjects in their work. The oeuvre of both men was replete with references to heavenly bodies, from the simple inclusion of the sun and moon to more inventive likenesses of starscapes and eclipses. The following discussion of such works is by no means exhaustive. Instead, this chapter provides a sampling of some of the more compelling examples of astronomical subjects in their artistic output.

In the painting of Miró the cosmos is a constant in lived and dreamed experience that can be rendered using a language of recognizable signs. While early works from the 1920s and 1930s reveal repeated renderings of astronomical bodies, his greatest engagement with astronomy occurred in the 1940-1941 series of Constellations. These small, gouache on paper works documented Miró's ascent to the heavens as a means to dismiss the horrors of his terrestrial existence and a world turned upside down by war. Here he depicted his own invented starscapes onto which he plots surreal tales and visions.

German-born artist Max Ernst demonstrated a lifelong fascination with science, including astronomical topics. In works associated with the earlier Dada movement as well as his later Surrealist production, the artist often borrowed from the imagery of scientific discourse. Whether focusing on the microscopic or the macrocosmic, Ernst found in the visual imagery of science a new subject for avant-garde art production that

also spoke to the modernist preoccupation with experimentation and discovery. Ernst's appropriation of cosmic images suggests a realm at once known and unknown, visible but just past the realm of experience, much like the Surrealist movement's quest to access the unconscious mind. While his oeuvre shows multiple instances of astronomical imagery and engagement, his 1964 book *Maximiliana ou l'exercice illegal de l'astronomie*, produced in collaboration with Russian avant-garde typographer and publisher Iliazd, marked Ernst's largest contribution to this history of Surrealist astronomy.

For both men, this cosmic preoccupation led to the creation of a Surrealist universe. Staring up at the stars, they managed to transform visible cosmic features into a new fantastic realm. More importantly, Miró and Ernst's early endorsement of astronomical themes and imageries as an appropriate subject for Surrealist painting likely encouraged later cosmic subjects in the work of those second-generation artists who joined Surrealism beginning in the mid-1930s.

MIRÓ AND ASTRONOMY

Miró was born in 1893 in Barcelona, Spain. Biographical accounts do not suggest any early or meaningful connection between Miró and the study of astronomy. However, scholar Paul Hammond has noted that his father, a goldsmith and watchmaker with whom he had a strained relationship, had dabbled with amateur astronomy during his son's youth.²⁵⁹ Work produced in Barcelona included little or no astronomical subjects or

²⁵⁹ Paul Hammond, *Constellations of Miró, Breton* (San Francisco: City Lights Books, 2000), 40. Hammond does not cite a source for this information. Miró's relation with his father was likely tense, in

motifs. Even in landscapes, such as *The Olive Grove* from 1919 [Fig. 7], the artist only included a simple, flat azure sky devoid of the sun or any other cosmic features.

In 1919 the young artist visited Paris for the first time, and by 1920 he left Barcelona for Paris—a city he felt was a better environment for artistic experimentation and the increasing abstraction of his canvases.²⁶⁰ After this move, Miró’s painting style gradually shifted toward the flat, primary-hued canvases brimming with simple, abstracted signs that comprise his mature work. My use of the term “signs” to designate Miró’s use of repeated, abstracted images is a reference to Jacques Dupin’s essay “The Birth of Signs.”²⁶¹ There Dupin had argued that the artist sought to strip down images to their latent content and explore their abstract, fantastic possibilities. Dupin writes, “At first relying on the geometric structures that shape it, the form gradually opens up to the emphases and distortions of fantasy, which transfigure lines and colors in a radical

part, because of his son’s failed career in business, after completing a course of study at the Escuela de Comercio in Barcelona in 1910, and his later enrollment at a Barcelona art school following a prolonged illness in 1911. For more on Miró’s biography, see Jacques Lassaigne, *Miró: Biographical and Critical Study*, trans. Stuart Gilbert (Geneva: Éditions d’Art Albert Skira, 1963). Also of use is the excellent chronology compiled by Anne Umland and found in the catalogue for the Museum of Modern Art’s 1993 retrospective of the artist. See Carolyn Lanchner, *Joan Miró* (New York: Harry N. Abrams, Inc., 1993), 317-361.

²⁶⁰ Miró’s early work in Spain showed visual affinities with both of the prevailing avant-garde styles of the period, Cubism and Fauvism. He had his first one-man show of works of this type in 1918 at the Gallery Dalmau in Barcelona. But, by early 1919, Miró’s canvases showed a use of flattened space and forms. Such work increasingly verged toward the abstracted visual content that was typical of his mature work from the 1920s. As biographer Lassaigne has noted, the artist’s first visit to Paris confirmed that the French city was the prime location for avant-garde innovation, and Miró contended that any future progress in his working style depended on his eventual relocation to the city. Over the succeeding two decades, however, Miró would never feel fully comfortable in Paris and split his time between the French capital and his family’s countryside coastal retreat in Montroig, just south of Barcelona. See Lassaigne, *Miró: Biographical and Critical Study*, 24-38.

²⁶¹ See Jacques Dupin, “The Birth of Signs,” in *Joan Miró: a Retrospective* (New York: Solomon R. Guggenheim Museum, 1987), 33-40.

absence of hierarchy that inaugurates a new order of values.”²⁶² As such the figural space depicted on the canvas became a place for the artist’s own fantastic invention and exploration. He sought to create images that were suggestive and that represented not just the basic form or object depicted but also a full range of suggested possibilities, both real and imagined. In the language of signs Miró developed in his paintings, he introduced a set of visual references to crescent moons, the sun and other planets rendered as bold circles and orbs (some with flame like projections), stars rendered as a series of crossed-hashes or simple five-point forms, and comets complete with trailing tails.

Many of these astronomical signs appear in one of his most celebrated canvases from his early period in Paris, *Carnival d’Arlequin* [*Harlequin’s Carnival*] from 1924-1925 [Fig. 8]. Miró’s canvas depicts a raucous interior scene. The Harlequin of the title stands at center grasping a guitar, his impossibly thin torso and yellow face held aloft by sizable distended feet. A host of strange hybrid creatures and dazzling forms surround him. The artist also includes his early lexicon of astronomical references. At top left a white orb and blue five-point star are shown with trailing tails, seemingly whizzing through the odd room. Other orbs, stand-ins for planetary bodies, can be found throughout the room, including a larger black and white sphere near an ascending ladder at left. Depicted against a flat blue sky outside the room’s window is yet another, small

²⁶² Dupin, “The Birth of Signs,” 34-35.

yellow orb with black, ray-like projections; similar red spheres with rays are also scattered throughout the interior space.

On the right side of the canvas, Miró depicts a blue tabletop. In addition to scattered, strange apparatuses and crumpled sheets of paper, the artist includes a large, dark green circle, pierced by an arrow connected to a larger armature. While abstracted, the form suggests a globe or other tool for astronomical enquiry. In a 1978 interview, Miró described the green form as a representation of the earth, included as a subtle reference to his desire to take over the world.²⁶³ Perhaps this was simply a boastful claim, late in life, that might be explained as a part of the omnipresent desire amongst artists to make their mark in the history of art. But, the inclusion of this tool for astronomical study along with myriad references to interstellar objects also documents Miró's fascination with the cosmos. As the painter noted in a 1959 interview,

The spectacle of the sky overwhelms me. I am overwhelmed when I see a crescent moon or the sun in an immense sky. In my paintings, there are often tiny forms in vast empty spaces. Empty spaces, empty horizons, empty planes—everything that has been stripped bare has always made a strong impression on me.²⁶⁴

In astronomy and the vast fields of interstellar space, the artist found a new domain in which to explore his newly invented language of abstracted signs. This fascination would play out over the rest of his career. Analysis of paintings reproduced in the 1999 catalogue raisonné of Miró's oeuvre yields more than two hundred works that

²⁶³ Lluís Permanyer, "Revelations by Joan Miró About His Work," in *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 291. This interview originally appeared in *Gaceta Ilustrada* (April 23, 1978).

²⁶⁴ Taillandier, "I Work Like a Gardener," 247.

either directly mentioned astronomical bodies in the title, such as his 1926 canvas *Chien aboyant à la lune* [Dog Barking at the Moon] [Fig. 9], or incorporated forms that likely signified cosmic features, such as *L'Ermitage* [The Hermitage] from 1924 [Fig. 10], which included a shooting star, bold red orb, crescent outlines, and a hashed star field all rendered against a bold yellow background.²⁶⁵ Furthermore, such visual references can be found in the artist's work in printmaking and sculpture.

Miró's adaptation of cosmic signs and imagery in his work coincided with his association with the Surrealist group in Paris. While Miró was not listed among those contemporary painters in a brief footnote in Breton's first manifesto published in 1924, he quickly became one of the artists championed by the poet and the group.²⁶⁶ During his first visit to Paris in 1919, Miró had attended Dada demonstrations and had met some of the poets who would later form the Surrealist group. By the winter of 1920, Miró had taken a studio at 45 Rue Blomet in the fifteenth arrondissement, just west of Montparnasse.²⁶⁷ Here he met André Masson, who shared the available studio space in the building. Over the course of the next two years, their studio played host to avant-

²⁶⁵ Jacques Dupin and Ariane Lelong-Mainaud, *Joan Miró: catalogue raisonné, paintings* (Paris: Daniel Lelong, 1999).

²⁶⁶ In the first manifesto, Breton lists major authors, both past and present, whom he feels were in tune with the foundations of the Surrealist project. In a brief footnote, Breton also lists painters who demonstrated ideas close to Surrealism in their work. Among those historical figures, he lists Georges Seurat, Gustave Moreau, and Paolo Uccello. Of his contemporaries, he listed, "Derain, Picasso, (by far the most pure), Braque, Duchamp, Picabia, Chirico (so admirable for so long), Klee, Man Ray, Max Ernst, and, one so close to us, André Masson." See Breton, *Manifestoes of Surrealism*, 26-27.

²⁶⁷ The extensive chronology included in the catalogue for the 2004 exhibition *Joan Miró, 1917-1934* at the Centre Pompidou provides researchers with an invaluable account of Miró's affiliations and actions during this span. Especially useful is the chronology's reliance on primary documents. See Agnès de la Beaumelle, ed. *Joan Miró, 1917-1934* (London: Paul Holberton Publishing, 2004), 296-375.

garde poets, writers, and artists, including early Surrealist founders such as Benjamin Péret and Paul Eluard. Despite this early affiliation with key members of the Surrealist movement, Miró would never sign any of the group's manifestoes.²⁶⁸ However, the support of Surrealist members helped cement his career. As Breton noted in his 1928 text "Le Surréalisme et la peinture" ["Surrealism and Painting"], "[Miró] could perhaps pass for the most 'surrealist' of us all."²⁶⁹ In addition to this endorsement, the artist's second one-man show, his first in Paris, was sponsored by the Surrealists. Miró also contributed work for display at the first exhibition of Surrealist painting in 1925, as well as most other major Surrealist shows over the next several decades.

Following the internal schism in the Surrealist group in 1929, Miró aligned himself with his friend Michel Leiris and the circle around Georges Bataille.²⁷⁰ While Breton generally cut ties with those who associated with Bataille during this period, he did maintain a friendship with Miró and still considered him a vital component of the Surrealist visual project. In his 1941 essay "Genèse et perspective artistiques du surréalisme" ["Artistic Genesis and Perspective of Surrealism"], Breton expressed both his

²⁶⁸ As Margit Rowell notes in the introduction to *Joan Miró: Select Writings and Interviews*, Miró had an extreme aversion to any labels, "and the absolute allegiance Breton demanded was antithetical to his nature." See Rowell, *Joan Miró: Select Writings and Interviews*, 12.

²⁶⁹ André Breton, "Surrealism and Painting," in *Surrealism and Painting*, trans. Simon Watson Taylor (Boston: MFA Publications, 2002), 36.

²⁷⁰ In 1929, Breton and Bataille disagreed about the Marxist foundations of the Surrealist project. Breton hoped to frame Surrealism in keeping with theories by both Freud and Marx, whereas Bataille envisioned a Surrealist project free from the strictures of Marxism. Part power-play and part rhetorical showdown, the two attacked one another in the pages of *La Révolution Surréaliste* and *Documents*, respectively. Many of those poets and artists that sided with Bataille were excommunicated by Breton. For a brief but excellent account of these events, see Briony Fer, David Batchelor, and Paul Wood, *Realism, Rationalism, Surrealism, Art Between the Wars* (New Haven, CT: Yale University Press, 1993), 204-209.

great admiration for Miró's contribution to the group as well as his frustrations with the painter's unwillingness to identify fully as a member of the Surrealist project. Breton wrote,

Miró's turbulent entry upon the scene in 1924 marked an important stage in the development of surrealist art. His work up to that point had demonstrated artistic gifts of the highest order limited only by a certain intellectual hesitation, but now at one bound he cleared the last obstacles that still barred his way to total spontaneity of expression. From then on, his output placed on record an innocence and freedom that have remain unrivalled. It is by no means impossible that his influence on Picasso constituted a determining factor in the latter's decision to throw in his lot with the surrealist two years later. The one negative aspect of Miró's undoubted aptitude has been a partially arrested development at the infantile stage which has left him ill-protected against unevenness, over-production and playfulness, and has set limits, intellectually, to the scope of his testimony.²⁷¹

For Breton, Miró's body of work was essential to the visual history of Surrealism. As Miró scholar Charles Palermo has argued convincingly, Surrealism did not influence Miró, but rather Miró influenced Surrealism.²⁷²

While the Surrealists admired Miró's fanciful, abstracted canvases and his development of a pictorial language of signs, the artist's approach to painting did not adhere to Surrealist modes of production. As defined by Breton, pure psychic automatism was at the core of the Surrealist project, the basic creative mode that allowed Surrealism to engage the unconscious. Whether using automatic drawing techniques,

²⁷¹ André Breton, "Artistic Genesis and Perspective of Surrealism," In *Surrealism and Painting*, trans. Simon Watson Taylor (Boston: MFA Publications, 2002), 70.

²⁷² Charles Palermo, *Fixed Ecstasy: Joan Miró in the 1920s* (University Park: The Pennsylvania State University Press, 2008), 1-2. Palermo rightly identifies the development of Miró's mature style as happening prior to his engagement with the Surrealist group (from 1924 on) and traces his engagement with other avant-garde luminaries, including the Kahnweiler circle and Michel Leiris.

such as those perfected by Masson, or the frottage and grattage techniques of Ernst, Surrealist visual production relied on uncontrolled or spontaneous modes of production. However, Miró's working techniques demonstrated little such engagement with automatism. The artist carefully planned his compositions in preparatory sketches and notebooks.²⁷³ In an attempt to classify Miró's practices as akin to automatism, many scholars have pointed to the artist's admission in a 1978 interview that he had created works, such as *Carnival d'Arlequin*, while experiencing hallucinations brought on by hunger. Speaking about that painting, Miró recalled,

That was when I was friends with the Surrealists. I was hungry and I was trying to capture hallucinations caused by my hunger. I wasn't painting things I saw in my dreams like Breton and his followers said you should. It was simply that hunger sent me into a sort of Oriental trance. That was when I made preliminary sketches of the general layout of the painting so that I'd know just where everything was going to go. Then after having thought about it for a long time, I started painting and making changes as I went along.²⁷⁴

Miró's account of these trances emphasizes two points that distinguish his work from that of other Surrealist artists. First, Miró's use of trance states was not always intentional, such as those used by group members in their experiments with mediumship mentioned in Chapter One. Rather, his hallucinations were often the consequence of his meager circumstances. Second, and perhaps more importantly, Miró emphasized the control he exerted over all his work. He maintained that his creative output was not solely the result

²⁷³ As Miró scholar Carolyn Lanchner has argued, Miró's work "validate[d] pictorial Surrealism" but was "indifferent to its extra-pictorial mission." See Lanchner, *Joan Miró*, 16. Lanchner's text also provides superb comparisons of early sketches and drawings with Miró's finished work.

²⁷⁴ Permanyer, "Revelations by Joan Miró About His Work," 290-291.

of unconscious processes and admitted to a working process that included careful contemplation and active decision-making, two acts that contradicted Surrealist automatism.

Given this approach to creative production, Miró's invention of his language of pictorial signs and the recurrence of visual elements, such as astronomical images, was not simply the product of an unknown unconscious mode but rather marked the artist's continued preoccupation with such themes. Miró reiterated these creative convictions in a 1948 interview with James Johnson Sweeney. The artist maintained, "For me form is never something abstract; it is always a sign of something. It is always a man, a bird, or something else. For me painting is never form for form's sake."²⁷⁵ And, astronomical signs figured regularly among those forms.

Astronomy and related concerns appeared in the artist's work not just in the 1920s but also in the succeeding decades of his career. In multiple letters and interviews over the years, Miró made mention of his preoccupation with cosmic ideas and locales. In a 1920 letter to architect J. F. Ràfols, the artist remarked, "This Paris has *shaken me up* completely."²⁷⁶ Miró then described the most awe inspiring locales encountered to date; not surprisingly, the artist listed the Louvre and the Luxembourg Gardens, but more significant was his mention of the avenue de l'Observatoire, site of the Paris Observatory,

²⁷⁵ James Johnson Sweeney, "Joan Miró; Comment and Interview," In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 207. This interview was originally published in *Partisan Review* 15 (February 1948).

²⁷⁶ Joan Miró, "To J. F. Ràfols. Paris, Hôtel de Rouen, May 8, 1920," In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 72.

which he proclaimed as one of the most striking locations in the city. In a later 1962 interview, Miró again confirmed his interest in cosmic themes. Asked about his use of symbolism, he remarked, “during those years [1925] my painting no longer showed the pull of gravity; I wanted to give it an astral quality.”²⁷⁷ Again in an interview from 1968, Miró confirmed his lifelong connection to all things astrological: “I believe in obscure forces. I believe in astrology. I am a Taurus, with Scorpio in the ascendant. Perhaps that is why there are spheres and circles in many of my paintings—to evoke the governing planets.”²⁷⁸

Further confirmation of Miró’s fascination with astronomy can be found in the décor chosen for the new studio he built in 1956 in Palma de Mallorca, an island in the Balearic Sea located off the east coast of Spain.²⁷⁹ Miró installed a small telescope in his studio, a means to further ponder the heavens.²⁸⁰ Another treasured object, a large anthropomorphized sun complete with staring eyes, a long, slender nose, and mouth set

²⁷⁷ Denys Chevalier, “Miró” In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 265. This interview was originally published in *Aujourd’hui: Art et Architecture* 7 (November 1962).

²⁷⁸ Pierre Bourcier, “Article (excerpts) from *Les Nouvelles littéraires*, August, 8, 1968,” In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 275.

²⁷⁹ Miró purchased a home on the island and had architect Josep Lluís Sert design a large, open studio on the grounds. Prior to this, Miró rented a small studio space at 4 Pasaje del Credito in Barcelona. Financial and political circumstances during World War II forced Miró and his family to return to Barcelona despite the artist’s animosity for the city. In a 1919 letter to fellow Spanish artist E. C. Ricart, he expressed this disdain referring to the “filthy, stinking waters of Barcelona.” Certainly the return to a smaller seaside vista such as Palma de Mallorca was a comforting relief for the artist, who spent most summers from the mid-1910s through the early 1930s at his family’s summer home in Montroig along the Mediterranean coast. See Joan Miró, “To E.C. Ricart. Montroig [September 4, 1919]” In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 65.

²⁸⁰ Hammond, *Constellations of Miró, Breton*, 40.

agape—all fashioned from woven palm fronds—dangled from the high ceiling in his studio and silently kept watch over the artist’s work space [Fig. 11]. This sun was documented by photographer Daniel Frasnay in a 1972 special issue of *XX^e Siècle*, which included a number of images of the artist’s studio space on the island.²⁸¹ The photograph, taken at a high vantage point, showed the sun hanging in the space and gave readers a view of the artist’s work-in-progress; multiple canvases, in various states of completion, lined the walls of a brightly lit space with high ceilings.²⁸² Frasnay’s photograph accompanied a brief poetic essay entitled “Volume of Light” that described the artist’s studio. He noted the presence of the large sun that “was bought at the Palm Sunday fair in old Barcelona,” one of many treasured objects with which the artist chose to surround himself.²⁸³ In a subsequent passage, Frasnay described Miró’s daily working rituals and his preference for painting early in the morning “when his only companion [was] the sun,” a poignant evocation of Miró’s repeated visual reliance on this heavenly body.

Miró’s most intense engagement with astronomical imagery and themes in his work occurred in the Constellation series, twenty-three gouaches on paper completed

²⁸¹ The entirety of this special issue dedicated to the artist was reprinted in English translation by the Tudor Publishing Company that same year. See G. di San Lazzaro, ed., *Homage to Joan Miró* (New York: Tudor Publishing Company, 1972).

²⁸² See di San Lazzaro, *Homage to Joan Miró*, 48.

²⁸³ Daniel Frasnay, “Volumes of Light,” In *Homage to Joan Miró*, ed. G. di San Lazzaro (New York: Tudor Publishing Company, 1972), 51.

between January 1940 and September 1941.²⁸⁴ In summer 1939, Miró had reached an emotional low point. Enraged by Franco's recent victory in Spain and increasingly aware of the threat of German occupation in France, Miró feared that forces beyond his control would soon end his life as an artist. In a 1978 interview he discussed his general pessimism and fear during the period; in such a chaotic political climate, "[he] was sure they wouldn't let [him] go on painting."²⁸⁵ By mid-August 1939, Miró left Paris and sought solace in Varengeville in Normandy.²⁸⁶

The artist recalled that he began creating the Constellations after his arrival at this small coastal town. He used a pad of paper with dimensions of thirty-eight by forty-six centimeters, which he had originally intended to use for cleaning his brushes.²⁸⁷ After one painting session Miró wiped his brush clean on the paper and was intrigued by the resulting hazy patches color. He quickly created the first work of the series, *Le Lever du soleil* [*Sunrise*] [Fig. 12], populating the pre-established spatial fields of color with his

²⁸⁴ The Constellation series has been much covered in the available literature on Miró, but no scholar has focused solely on the astronomical import of these works. In addition to the aforementioned *Constellations of Miró, Breton* by Paul Hammond, see Matthew Gale, "From *Constellations* to the Barcelona Series," in *Joan Miró: The Ladder of Escape*, ed. Marko Daniel and Matthew Gale (New York: Thames and Hudson, 2011), 123-139; Edward B. Henning, "Joan Miró: *Woman with Blond Armpit Combing Her Hair by the Light of the Stars*," *The Bulletin of the Cleveland Museum of Art*, 55 (March 1968): 71-77; Lanchner, *Joan Miró*, 70-71; Joan Teixidor, "Constellations," in *Homage to Joan Miró*, ed. G. di San Lazzarro (New York: Tudor Publishing Company, 1972), 38-41; and Lillian Tone, "The Journey of Miró's Constellations," *MoMA* 15 (Autumn 1993): 1-6.

²⁸⁵ Permanyer, "Revelations by Joan Miró About His Work," 294.

²⁸⁶ This coastal retreat was also fitting given Miró's earlier seaside home in Montroig, Spain. Here, as mentioned, he found a reprieve from the bustle of city life and enjoyed a slower, relaxed life more conducive to creative production. One can assume, too, that at both these coastal towns Miró would have been afforded impressive views of the sky not often available in Paris. These unimpeded views of the heavens may have served as a further impetus for his Constellations.

²⁸⁷ Permanyer, "Revelations by Joan Miró About His Work," 295.

signature bold pictorial signs.²⁸⁸ In the upper left corner, an abstracted, long-haired woman floats with her arms held aloft. Below her are three dark black orbs, rendered diagonally across the center space of the image. Three additional creatures fill the remaining space at the bottom right of the composition.

In this first image, Miró did not firmly establish the visual references to star fields and constellations mentioned in the series' title. In subsequent works, he would populate his compositions with star forms as well as black circles and triangles inventively joined via curving lines. But, Miró began his series with the sun; the three large orbs likely referenced the sun's daily passage across the sky. For the artist, the sun signified constancy, a loyal, daily companion on which he could rely. In an interview just four years prior, Miró had remarked, "wherever you are, you can find the sun...courage consists of staying at home, close to nature, which could not care less about our disasters."²⁸⁹ This first work in the series and its central focus on the rising sun revealed the way in which both the series and the heavens created a mental reprieve for the artist, a means of escape from the dire situation faced by Europe at the time. Miró confirmed this sense of escape in a later interview: "When I was painting the Constellations I had the genuine feeling that I was working in secret, but it was a liberation for me in that I ceased

²⁸⁸ Paul Hammond has argued that the claim that each new work of the series was created as he cleaned his brush on the next available sheet of paper was likely false. In his eyes, the stained ground of *Le Lever du Soleil* shows evidence of this staining process but subsequent works in the series belie a more careful, planned application of pigment. See Hammond, *Constellations of Miró, Breton*, 34.

²⁸⁹ George Duthuit, "Where Are You Going, Miró?," In *Joan Miró: Select Writings and Interviews*, ed. Margit Rowell (Boston: G. K. Hall & Co., 1986), 153. This article was originally published in *Cahiers d'Art* 8-10 (1936).

thinking about the tragedy all around me. While I was working, my suffering stopped.”²⁹⁰

Miró completed the first ten works in the Constellation series while at Varengeville. By late May 1940, the Nazis had begun bombing Normandy, and Miró and his family fled from their countryside retreat. After a brief stop-over in Perpignan in the south of France, they traveled south into Spain, eventually seeking refuge with his wife’s family in Palma de Mallorca sometime in June or July 1940. Miró continued his work on the series after his arrival on the island. Between September 1940 and June 1941, he completed an additional ten Constellations. The artist was able to return to Montroig in July 1941; here he finished the remaining three works in the series.²⁹¹

Each of the Constellations provided an inventive space for the artist to escape the increasing threats of wartime. Works two, three, and four (*L’Échelle de l’évasion* [*The Escape Ladder*], *Personnages dans la nuit guidés par les traces phosphorescentes des escargots* [*Figures at Night, Guided by the Phosphorescent Tracks of Snails*], and *Femmes sur le plage* [*Women on the Beach*]) [Figs 13, 14, and 15] continued in much the same style as *Le Lever du soleil*. Miró populated the stained, textural ground of the paper with a myriad of his already familiar forms in bold hues of red, blue, yellow, green, white, and black. Astronomical elements remained a constant; a bold white crescent hovers in *Personnages dans la nuit*, while numerous orbs, circles with rays, and star

²⁹⁰ Permanyer, “Revelations by Joan Miró About His Work,” 294-295.

²⁹¹ This timeline is comprised of data found in Umland’s chronology for the 1993 Miró exhibition at the Museum of Modern Art. See Lanchner, *Joan Miró*, 334-336.

forms populated *L'Échelle de l'évasion*. However, in the fifth work from the series, *Femme à la blonde aisselle coiffant sa chevelure à la lueur des étoiles* [Woman with Blonde Armpit Combing Her Hair by the Light of the Stars] [Fig. 16], the visual comparison to constellations had become an obvious focus for the artist.

Miró rendered the woman from the title as a vague abstraction, even more intangible than his typical treatment of the female form. In much of his oeuvre, Miró's female forms were fully-formed, heavy bodies often characterized by flowing locks of hair or pendulous breast forms. Such representations can be seen in the fourth work from the series, *Femmes sur le plage*. In the fifth Constellation, the female is nothing more than an echo. Soft, curvilinear shapes at center only hint at his feminine subject. More interesting, however, is the way in which Miró populated the remaining visual field. Blue stars, a white crescent moon, and numerous black and red circles fill the space, while sketchy, black lines connect these forms. Here Miró created surreal constellations, connecting stars and other heavenly bodies—albeit in his own invented cosmos—in order to create the woman to which his title alluded. In subsequent works from the series, Miró continued to connect the dots, dashed stars, and other shapes filling his imagined starscapes in order to form the creatures and other objects referenced in his fantastic titles.

Miró's inventive mapping of the shapes in the visual field of each work was not unlike the practice of star mapping used since earliest times. In ancient cultures, humans mapped the heavens, joining and connecting the stars and visible planets as a means to

recognize and chart the changing night sky.²⁹² The motion of the sun, moon, and stars affected life. The basic passage of time, seasonal changes, and other marks of measure were all recorded using heavenly bodies. As a result ancient cultures transferred their own mythologies to the stars as a means to understand, better remember, and follow these changes.

In the western world, star charts and constellations established by the ancient Greeks are still recognized today.²⁹³ Ancient Greek astronomers tracked the annual path of the sun by grouping stars within this band of sky and creating the twelve zodiac constellations. Each month of the year, the sun passes through one of these formations. Ptolemy's *Almagest*, written around 150 AD, provides one of the most important extant records of ancient conceptions of the night sky and the mapping of constellations by ancient cultures. His text divided the then 1028 observable stars into forty-eight constellations. Ptolemy's observations and descriptions were not unique—he compiled astronomical references and materials from now lost authors. Nonetheless, his text is one of the oldest remaining star catalogues.

During the early modern age of discovery, new constellations were added to chart stars visible in the Southern Hemisphere. The advent of the telescope around 1608 allowed astronomers and amateurs alike to chart newly visible stars; other new

²⁹² For a history of constellations and star maps, see Nick Kanas, *Star Maps: History, Artistry, and Cartography* (New York: Springer Science + Business Media, 2012); and Carole Stott, *Celestial Charts: Antique Maps of the Heavens* (New York: Smithmark, 1995).

²⁹³ Other cosmologies and mappings of the heavens existed in China, Mesopotamia, India, and Egypt; the images and figures mapped onto the stars reflected the mythologies and beliefs of each individual culture.

constellations were formed to reflect this changing understanding of the night sky. Today astronomers recognize eighty-eight constellations; these were officially approved at the first meeting of the International Astronomical Union in 1922.²⁹⁴

In Western astronomy and culture, each constellation referenced a mythical or historical tale. These constellations have been documented in star charts and celestial maps over the centuries. In most cases, the stars that form a constellation are connected in the sky and produce only a rough outline or form suggestive of that constellation's name. For example, the constellation Orion has been known since ancient times and is easily distinguished by the three stars in close proximity that form the ancient hunter's belt.²⁹⁵ Ancient Greek cartographers formed Orion's body using eight primary stars; other nearby stars outlined his raised club and a lion with which he battled. Three bright stars, Alnitak, Alnilam, and Mintaka, comprise the hero's belt. Located above these features, three other stars, arranged in a triangular shape, represent Orion's shoulders (on the left, the supergiant Betelgeuse and on the right, Bellatrix) and head (Meissa). Below his three-starred belt, two other stars form his lower extremities: Saiph represents his left, bent knee and Rigel denotes his right ankle. A simple sketch of the star formation yields an image of two conjoined polygons that only vaguely reference a kneeling warrior.

However, this simple arrangement of stars presented celestial cartographers with a space

²⁹⁴ Stott, *Celestial Charts*, 11.

²⁹⁵ Astrologer Geoffrey Cornelius' *The Starlore Handbook* charts the eighty-eight recognized constellations. He addresses mythic and historic origins, astrological context, and astronomical observation in an easy to use manual. For his description of Orion, which he argues "could compete for instant recognition" among most stargazers, see Geoffrey Cornelius, *The Starlore Handbook: An Essential Guide to the Night Sky* (San Francisco: Chronicle Books, 1997). See also Michael E. Bakich, *The Cambridge Guide to the Constellations* (New York: Cambridge University Press, 1995).

for creative allusion and illustration. Cartographers transformed these simple sketched configurations into more complex shapes and forms such as the hulking, armor clad warrior, Orion.

In the Constellation series, Miró plotted the personae and strange scenes suggested by his titles onto a field of abstract signs and shapes. The viewer is left to imagine and fill in the spatial field with the imagery implied within each title. In the final work from the series, *Le Passage de l'oiseau divin* [*The Passage of the Divine Bird*] [Fig. 17], the artist formed the divine bird of the title by joining various scattered dots and stars. In the upper third of the image, a looping line suggests the bird's body. Much like previous celestial cartographers, Miró then added distinguishing details and features, including three, staring eyes, perhaps a reference to the bird's all-knowing, divine status.

After completing the series, Miró managed, with some difficulties, to send the completed Constellations to his New York dealer, Pierre Matisse.²⁹⁶ He withheld number twenty-three, which he had given to his wife as a gift. Despite initial plans to show the series at the Museum of Modern Art in 1944, it was not exhibited until January 1945 at the Pierre Matisse Gallery. Miró was meticulous in his instructions regarding how the series should be installed; these demands likely played some role in the failed showing at MoMA. The artist insisted that all works be shown together and in the order of their

²⁹⁶ Permanyer, "Revelations by Joan Miró About His Work," 295. As Miró recalled, he enlisted the help of a Brazilian cultural attaché then stationed in Spain. The unnamed embassy official mailed the work to Matisse in a diplomatic pouch.

completion so as to “explain [his] evolution and [his] state of mind.”²⁹⁷ Moreover, he asked that the museum frame the works, taking care not to obscure the titles inscribed at the bottom of each work. Miró maintained that the titles were integral to interpretation, and they provided a viewer with the key to the fantastic images illustrated within each imagined stellar space. Despite these demands, when Matisse displayed the work in his own gallery, he chose to feature only sixteen works at a time, rotating the compositions on view for the duration of the exhibition.²⁹⁸

In early 1959, the Constellation series was exhibited for the first time in Paris at Galerie Berggruen. The show featured some of the original works from the series along with facsimiles of the twenty-two works originally displayed in 1945—*Le Passage de l’oiseau divin* was still in the possession of Miró’s wife and remained an unknown component of the series at this time. In celebration of the re-exhibition, the Pierre Matisse Gallery released a limited edition album of these facsimiles, which included an

²⁹⁷ Lanchner, *Joan Miró*, 336.

²⁹⁸ Matisse explained in a letter to the artist that this decision was made under advisement from a number of Miró’s friends and acquaintances then in New York, including Breton and James Johnson Sweeney, who at the time served as a curator at MoMA. Sweeney had overseen the first major one-man show of Miró’s work in the United States at MoMA in late 1941. *Joan Miró* opened at the museum on November 18, 1941 and closed January 11, 1942. The show then traveled to the Smith College Museum of Art, Vassar College, the Portland Museum of Art, and the San Francisco Museum of Art. See James Johnson Sweeney, *Joan Miró* (New York: The Museum of Modern Art, 1941). See Lanchner, *Joan Miró*, 359 n. 673. The exhibition of the Constellation series in New York was also important for its impact on young American painters. The all-over nature of Miró’s work in this and other series served as a springboard for the later works of abstract expressionists. For more on the link between Miró’s abstract surrealism and the later abstract expressionists, see R. C. Hobbs, “Early Abstract Expressionism and Surrealism,” *Art Journal* 45 (Winter 1985): 299-302; Barbara Rose, *Miró in America* (Houston: Museum of Fine Arts, Houston, 1982); Martica Sawin, *Surrealism in Exile and the Beginnings of the New York School* (Cambridge, MA: The MIT Press, 1995); and Paul Schimmel, *The Interpretive Link: Abstract Surrealism into Abstract Expressionism* (Newport Beach, CA: Newport Harbor Art Museum, 1986).

introductory essay and poems to accompany each of the twenty-two works in the series, both written by Breton.²⁹⁹

Scholars are uncertain if Breton composed his essay and poems after having seen the reproductions prepared for this reissue or if he based his prose on recollections of the 1945 exhibition in New York.³⁰⁰ Regardless, the poems provided little additional insight into the series. Breton's short, free verse poems are riddled with obscure associations and suggest little more than cryptic word play loosely based on Miró's titles. His introductory essay, however, sheds light on the importance of the Constellation series both as a testament to the time in which it was created and its possible occult and astronomical revelations.

In the essay, Breton praised the work of the artist as a unique reflection of the dire wartime circumstances of their creation, and he highlighted Miró's unwillingness to succumb to these forces. According to Breton, the series was a decisive act of resistance.³⁰¹ He also stressed the occult significance of series. The twenty-third work from the series was still an unknown component. For Breton, Miró's choice to produce twenty-two works in the series was inherently connected to the significance of that

²⁹⁹ Breton's essay had originally appeared in a condensed version as "Constellations de Joan Miró" in *L'Oeil* 48 (December 1958). Paul Hammond provides a full translation of the essay, as it appeared in the Pierre Matisse album. See Hammond, *Constellations of Miró, Breton*, 187-194.

³⁰⁰ Hammond notes that his wife Elisa purchased image seventeen, *Femmes encerclées par le vol d'un vaisseau* [Women Encircled by the Flight of a Bird], from Pierre Matisse in 1945; therefore he could have viewed this work in its original format as he prepared his essay. See Hammond, *Constellations of Miró, Breton*, 72.

³⁰¹ André Breton, "Constellations of Joan Miró," In *Constellations of Miró, Breton*, trans. Paul Hammond (San Francisco: City Lights Books, 2000), 190.

number in Kabbalistic practices and the Tarot. There are twenty-two letters in the Hebrew alphabet, which correspond to the twenty-two paths on the symbolic Tree of Life, and there are twenty-two cards in the Tarot's major arcana. Given this numerological link, Breton contended that the series was "a perfect cycle" with hermetic significance.³⁰² Perhaps most important for this study, Breton hinted at the astronomical import of the series. His focus was not the beauty of the images themselves but instead on the overwhelming beauty of the cosmos to which the series essentially referred. He wrote, "Over and above appreciation of the technical means, however knowing and novel these are, what captivates us in the presence of the CONSTELLATIONS is the unfreezing of space they present to our gaze, the endlessly reverberating echo that this unfreezing awakens in us."³⁰³ As Breton rightly recognized, the stars captivate us and provided yet another realm for Surrealist invention. Despite the fact that Miró carefully planned his compositions, the act of transferring desires and strange tales onto the night sky marked a unique contribution to Surrealist automatic practice.

In the Constellation series, Miró sought solace in the stars, and his journey into this invented cosmos served as a catharsis. His imagined starscape provided both a reprieve from troubling contemporary events and a space for unrestricted creative expression. Over the course of his career, Miró repeatedly relied upon his language of signs; while women, birds, and other creatures appear again and again, so, too, do his

³⁰² Breton, "Constellations of Joan Miró," 191.

³⁰³ Breton, "Constellations of Joan Miró," 192.

stars, suns, and moons. While his technique varied over time, cosmic elements remained a prominent subject in his work.

Miró's work produced in the 1950s reveals his experimentation with the crudely rendered forms seen in Art Brut or the splattered paint application of Abstract Expressionism. Nevertheless, cosmic themes persist. In *La Chéveleure défaite à la fuite des constellations* [*Hair Disheveled by the Fleeing Constellations*] from 1954 [Fig. 18], the delicate shapes and bright colors of his earlier work have been replaced by a darker, more somber palette and rough, thick forms that bear resemblance to paintings by Jean Dubuffet. Still, the artist's chosen subject of constellations and the now familiar forms of a large star, green crescent, and red and yellow orbs demonstrate his continued interest in astronomy. Another, magnificent oil on canvas, *Le Disque rouge* [*The Red Disk*] from 1960 [Fig. 19], features splattered white pigment against a black ground. The application of white paint suggests Jackson Pollock's drips or the bold gestural forms of Adolph Gottlieb. Yet, rendered against the dark black ground, Miró's swirling forms suggest the Milky Way or some other far off galaxy. The red disk of the title maintains his repeated use of signs, with another yellow circle and a star further emphasizing the work's astronomical theme.

In his 1938 *Autoportrait I* [Fig. 20], Miró managed to capture the primacy of astronomical content within both his life and his work as an artist.³⁰⁴ Produced using

³⁰⁴ Other scholars have interpreted this work as a part of the artist's reflection on political resistance in the wake of recent events of the Spanish Civil War. See Lomas, *The Haunted Self*, 188-191; and Teresa Montaner, "The Profound Poetic Reality," in *Joan Miró: The Ladder of Escape*, ed. Marko Daniel and Matthew Gale (New York: Thames and Hudson, 2011), 99-107. While these interpretations are certainly

pencil, crayon, and oil on canvas, a sketchy portrait of the artist in suit and tie was rendered over a hazy, multicolored background. While Miró's visage is fairly naturalistically rendered, the artist also chose to incorporate many of the signs seen in his more abstract work. A viewer cannot help but notice that the artist's pupils have been transformed into evocative astronomical forms, a five-sided star at left and a rayed sun at right. Stellar and solar signs feature prominently elsewhere in the composition. Three suns are inscribed over his body—two on either lapel and one at the knot of his tie—while two additional stars hover over each of his shoulders. Other suggestive forms, such as orbs and trailing, comet-like tails, also surround the portrait. This preponderance of cosmic imagery and its incorporation in his self-portrait reveal not only the primacy of these signs and themes in Miró's art but also his constant personal fixation on all things astronomical.

ERNST AND ASTRONOMY

Like that of his Surrealist colleague Miró, Max Ernst's early biography reveals little meaningful connection to astronomical concerns.³⁰⁵ But, as an adolescent, he had

valid, the incorporation of astronomical elements is also suggestive. Like the rest of Miró's body of work, forms always signify a known thing or idea, but the meaning implied by the inclusion of such signs is never fixed.

³⁰⁵ Ernst kept detailed notes on his life that have since been published under the title "Biographical Notes: Tissue of Truth, Tissue of Lies." His notes do not take the format of a traditional memoir. While they are organized chronologically, these notes and sometimes obscure anecdotes were written and rewritten by Ernst over the years. See Max Ernst, "Biographical Notes: Tissue of Truth, Tissue of Lies." in *Max Ernst: A Retrospective* ed. Werner Spies (Munich: Prestel, 1991), 281-339. In another brief essay from 1942, Ernst revealed his interest in astronomical topics when he chose to include images of his astrological birth in an article for *View* magazine. See "Some Data on the Youth of M.E. as Told by Himself." *View* 2 (April

some introduction to a fantastic version of the cosmos as it appeared in adventure tales and science fiction. Ernst was a voracious reader of such literature. Among his favorites were German author Karl May's made-up tales of life in the American west and the imaginary voyages by Jules Verne.³⁰⁶ In Verne, Ernst would have certainly been exposed to astronomical fantasies, including his *From the Earth to the Moon*. Moreover, this literature inspired in Ernst an interest in exploration that would carry over to his later Surrealist oeuvre and his quest to visualize the unconscious.

Ernst's first notable exposure to scientific training and discourse occurred prior to his emergence as an artist. Between 1909 and 1914, Ernst attended the University of Bonn. In addition to coursework in literature, art history, and philosophy, he also enrolled in both clinical and experimental psychology classes.³⁰⁷ In clinical courses such as "Selected Topics in Criminal Psychology" and "The Mentality of Abnormal Children" Ernst gained exposure to diagnostic approaches to the field. He also enrolled in experimental psychology classes, most notably those taught by Oswald Külpe, who was a onetime student of Wilhelm Wundt, a pioneer in the field.³⁰⁸ These courses provided

1942): 28-30. For more on Ernst's biography, see also William A. Camfield, *Max Ernst: Dada and the Dawn of Surrealism* (Munich: Prestel, 1993); John Russell, *Max Ernst: Life and Work* (New York: Harry N. Abrams, Inc., 1967); and Werner Spies, ed., *Max Ernst: Life and Work, An Autobiographical Collage* (New York: Thames and Hudson, 2005).

³⁰⁶ Camfield, *Max Ernst: Dada and the Dawn of Surrealism*, 34. Camfield notes that Ernst embarked on his own such fantastic voyage at the age of seventeen when he spent the summer hiking and sketching in parts of Holland, Western Germany and the Alsatian territories.

³⁰⁷ Camfield, *Max Ernst: Dada and the Dawn of Surrealism*, 35.

³⁰⁸ For more on Wundt and the history of experimental psychology, see Eliot Hearst, ed., *The First Century of Experimental Psychology* (New York: Wiley, 1979); George Mandler, *A History of Modern Experimental Psychology: From James and Wundt to Cognitive Science* (Cambridge, MA: The MIT Press,

Ernst with an introduction to the experimental procedures of science and the rigors of laboratory-based inquiry. Perhaps most important to his future development as a Surrealist artist, Ernst was also exposed to the writings of Freud for the first time during his years as a student at Bonn.

Ernst's artistic production first showed evidence of a borrowing from scientific iconography in the Dada collage works produced after World War I.³⁰⁹ Ernst appropriated images from technical manuals, educational diagrams, and popular science periodicals.³¹⁰ In his 1937 essay "Beyond Painting" the artist recalled his initial impetus to use scientific imagery:

One rainy day in 1919, finding myself in a village on the Rhine, I was struck by the obsession which held under my gaze the pages of an illustrated catalogue showing objects designed for anthropologic, microscopic, psychologic, mineralogic, and paleontologic demonstration. There I found brought together elements of figuration so remote that the sheer absurdity of that collection provoked a sudden intensification of the visionary faculties in me and brought forth an illusive succession of contradictory images, double, triple, and multiple images, piling up on each other with the persistence and rapidity which are peculiar to love

2007); and R. W. Rieber, *Wilhelm Wundt and the Making of a Scientific Psychology* (New York: Plenum Press, 1980).

³⁰⁹ Ernst decided upon a career as an artist as early as 1912, but was then forced to serve in the German army between 1914 and 1918. Wartime service left Ernst hardened and critical of society. Likely as a result of this skepticism, Ernst had become affiliated with the Dada artists in Zurich by 1917. After the war, Ernst would become an organizer of the Dada group in Cologne.

³¹⁰ As previously mentioned, Charlotte Stokes established Ernst's reliance upon images from later nineteenth-century issues of the French popular science periodical *La Nature*. See Stokes, "The Scientific Methods of Max Ernst," 453-465. Camfield also provides an excellent account of Ernst's borrowed scientific imagery. See Camfield, *Max Ernst: Dada and the Dawn of Surrealism*, 329-352. For more on Ernst's work in the collage medium, see Werner Spies, *Max Ernst Collages: The Invention of the Surrealist Universe*, trans. John William Gabriel (New York: Harry N. Abrams, Inc., 1991).

memories and visions of half-sleep.³¹¹

While he made no mention of the impact of astronomy during his retelling of this revelatory moment, collage work from the period includes some borrowing from astronomical imagery.

In *Untitled* from 1920 [Fig. 21], Ernst pieces together strange shapes into a nonsensical construction pictured in a landscape. In the sky above his towering edifice, Ernst includes a number of invented constellations, reduced to simple dot and line drawings. These same constellations appear in other works from the same year, including *Sodaliten Schneeberger Drückthäler* [*Always The Best Man Wins*] and *Katharina Ondulata* [Figs. 22 and 23]. These hand-drawn additions to his composition show a borrowing from scientific diagrams, which so fascinated Ernst.

In two other collages from 1920, *The Cormorants* [Fig. 24] and *The Flamingos*, the artist incorporated two magazine illustrations of planets.³¹² In the two works, flamingos strut in a watery scene. Above them, Ernst added aerial photographs of landscapes and other strange diagrammatic imagery. In the bottom right of the composition, a small planet or ball has been added just before the procession of flamingoes. In the top left corner, an angel hovers adjacent to a small clipping of the ringed planet Saturn. The easily identified rings of Saturn also appear in other works

³¹¹ Max Ernst, "Beyond Painting," trans. Dorothea Tanning, in *Max Ernst: Beyond Painting And Other Writings by the Artist and His Friends*, ed. Robert Motherwell (New York: Wittenborn, Schultz, Inc., 1948), 14. Ernst's essay was first published in *Cahiers d'Art* 11 (1936).

³¹² *The Flamingos* was a photographic enlargement of *The Cormorants*. *The Flamingos* is almost identical to the earlier work, except for the addition of poetry along the top and bottom of the image.

from the era. In *Santa Conversazione* from 1921 [Fig. 25] the rings encircle the legs of a nude female form, and in *My Little Mont Blanc* from 1922 [Fig. 26] the rings again appear around a female nude, this time crowning the headless figure's raised buttocks. In all of these works, the images of science are haphazardly arranged into the alogical compositions typical of the Dada movement with which Ernst was associated at the time. But, in their borrowing from easily identifiable scientific imagery, they also serve to document his early preoccupation with astronomical themes.

In her assessment of these early Dada collages, Charlotte Stokes has argued that Ernst's use of such scientific imagery reveals his "ambivalence" to science.³¹³ According to her argument, he likely appreciated the psychologically suggestive nature of such imagery. However, these images also referenced a scientific and supposedly rational cultural system that the Dadaists distrusted and blamed for the destruction seen during World War I. Using the collage technique, Ernst symbolically dismantled such institutions as he cut apart and reconfigured the once logical diagrams of scientific discourse into illogical musings. His works were an act of cultural mutiny providing an antithetical vision of contemporary science. In keeping with his Dadaist affiliations, such a reading of these images is certainly valid. But the passion and "obsession" with scientific images, which Ernst recalled in "Beyond Painting," suggests that his use of such imagery was more than simply a critique of culture. Moreover, scientific subjects

³¹³Stokes, "The Scientific Methods of Max Ernst," 454.

continued in his work for the rest of his career, long after his affiliations with Dada had ended.

Between 1919 and 1921, Ernst, then working in Cologne, maintained a correspondence with members of Paris Dada. His work was featured in a one-man show sponsored by the Paris Dada group, *Exposition Dada Max Ernst*, at the gallery Au Sans Pareil in May 1921. But, upon his arrival in Paris in August 1922, he found the group in shambles.³¹⁴ In-fighting had led Breton and others involved with the journal *Littérature* to separate themselves from the efforts and activities of Tzara. Perhaps due to his close friendship with Paul Eluard—one of Breton’s *Littérature* compatriots with whom Ernst lived upon his arrival in Paris—or due to his shared interest in psychology and related concerns, Ernst chose to align himself with Breton. Soon after, in July 1923, tensions in the Paris Dada group reached their zenith at the *Soirée de la Coeur à gaz*, a Dada performance held at the Théâtre Michel. Breton, along with compatriots Eluard, Benjamin Péret, and Louis Aragon, stormed the stage and effectively disrupted the evening’s activities. The event was the last gasp of the struggling Dada group.

The following year in the First Manifesto of Surrealism, Breton identified Ernst’s collage works as having been made in a similar spirit to that of the newly formed movement. As Breton later recognized, “It would not be an exaggeration to say that Max Ernst’s first collages, with their extraordinary suggestive power, were welcomed among

³¹⁴For more on the history of Paris Dada and Ernst’s involvement in this group, see Leah Dickerman, ed., *Dada: Zurich, Berlin, Hannover, Cologne, New York, Paris* (Washington D.C.: National Gallery of Art, 2005); Elmer Peterson and Stephen C. Foster, ed., *Paris Dada: The Barbarians Storm the Gates* (New York: G. K. Hall, 2001); and Michel Sanouillet, *Dada in Paris*, expanded edition by Anne Sanouillet, trans. Sharmila Ganguly (Cambridge, MA: The MIT Press, 2009).

us like a revelation.”³¹⁵ But, while Ernst’s Dada collages were seen as a visual precursor to Surrealism, Ernst understood that his working methods were not entirely in keeping with the movement’s focus on pure psychic automatism. As a result, the artist began to experiment with new methods for automatic art production that might function similarly to automatic writing. By summer 1925, Ernst began producing works using his frottage technique.³¹⁶ Employing a crayon or pencil lead, Ernst created rubbings of various textures—wood grain, natural elements, etc.—and then probed the resulting images to unveil the latent unconscious content. This mode of creation was certainly not new; it was a popular mode for producing copies of ancient monuments and inscriptions. However, frottage provided Ernst with an improvisational means of creation akin to techniques in automatic writing. Using these methods, Ernst produced his first major Surrealist work, *Histoire naturelle*. Notably this series marked a continuation of Ernst’s preoccupation with scientific themes and subjects, including astronomical imagery.

³¹⁵ Spies, *Max Ernst Life and Work*, 83. This passage, translated from the French by Pamela J. Warner, originally appeared in André Breton, *Entretiens 1913-1952* (Paris: Gallimard, 1952), 75.

³¹⁶ Much like his discovery of the scientific diagrams six years prior, Ernst remembered the event having occurred on a rainy day. He wrote, “I was struck by the obsession that showed to my excited gaze the floor-boards upon which a thousand scrubbings had deepened the grooves. I decided then to investigate the symbolism of this obsession and, in order to aid my meditative and hallucinatory faculties, I made from the boards a series of drawings by placing on them, at random, sheets of paper which I undertook to rub with black lead. In gazing attentively at the drawings thus obtained, ‘the dark passages of those of a gently lighted penumbra,’ I was surprised by the sudden intensification of my visionary capacities and by the hallucinatory succession of contradictory images superimposed, one upon the other, with the persistence and rapidity characteristic of amorous memories. My curiosity awakened and astonished, I began to experiment indifferently and to question, utilizing the same means, all sorts of materials to be found in my visual field: leaves and their veins, the ragged edges of a bit of linen, the brushstrokes of a ‘modern’ painting, the unwound thread from a spool, etc.” Ernst continues by recounting those objects which he then discovered in the resulting rubbings. He insisted that the resulting finished works “offered themselves spontaneously.” See Ernst, “Beyond Painting,” 7-8.

First published as a limited edition artist's book in 1926, *Histoire naturelle* included thirty-four collotype reproductions of Ernst's original frottage works.³¹⁷ While most of the images in the series depicted assorted flora and fauna, some images documented the terrestrial and cosmic environment in which such organisms exist. In the first two works in the series, *La Mer et la pluie* [*The Sea and the Rain*] and *Un Coup d'oeil* [*A Quick Glance*], [Figs. 27 and 28] Ernst includes references to a large, round heavenly body, likely the sun, hovering above a small sliver of landscape. In *La Mer et la pluie* a large quadrilateral form contains a prominent circle, the sun floating above the beleaguered seas of the title. *Un Coup d'oeil* features a vast aerial panorama. Centered above the ground plane, fragmented, round forms encircle an incomplete, rayed object. The resulting image mimics the blinding temptation to stare at the sun or its glowing pulse in a bright cloudless sky. In both images, circular forms evoke the sun's presence and dominate the composition. Despite the lack of a direct reference to astronomy in the titles, celestial space emerges as a prominent focus.

Image three from the series includes the most obvious references to astronomical themes. Entitled *Petites Tables autour de la terre* [*Little Tables Around the Earth*] [Fig. 29], Ernst's composition is again composed of a small stretch of land below the night sky. Four circular forms populate the dark expanse. Among these, three smaller planetary bodies, each rendered with its own distinct surface, surround a larger cosmic

³¹⁷ Patented in 1855, collotype was the first viable commercial printing process used to reproduce the gray-scale found in photographic images. The resulting images often exhibit subtle textural imperfections. Ernst likely chose this mode of reproduction in order to more faithfully reflect the subtle value transitions seen in the original frottage works.

entity. This larger, irregular form with harsh striations resembles the moon; its coarse irregularities suggest the chiaroscuro appearance of hand drawn maps of lunar craters and valleys.³¹⁸ A darkened crescent-like patch obscures the top portion of the form, a fitting textural means of depicting the lunar cycle and a waxing gibbous moon. Whether such details were the result of the automatic improvisations of frottage or subtle later additions to the composition, they certainly confirm that Ernst had more than a passing knowledge of the imagery of astronomical study and observation. In his assessment of *Histoire naturelle*, Roland Penrose commented on the way in which works from the series appropriated scientific vision:

There appeared to be an integral association between small and great, minute detail and infinite space...it surprised me at once by the tantalizing disparity characteristic throughout between the image and its title—a gap amounting to a systematized incongruity or a provocative ambiguity that demands to be bridged by the imagination.³¹⁹

As Penrose affirms, Ernst's images reveal the splendor of our unaided vision of the cosmos while at the same time demonstrating the tantalizing details derived from telescopic or assisted observation. Thus, his images reflect not only the subject of scientific inquiry but also the observational methods of the discourse. Later in the same essay, Penrose ponders Ernst's inventive inclusion of scientific phenomena. While his comment is limited to *Histoire naturelle*, it also encapsulates Ernst's lifelong

³¹⁸ Galileo first adapted the use of chiaroscuro for his observations of the lunar surface around 1609. For a discussion of the astronomer's borrowing from Renaissance drawing and painting techniques, see Samuel Y. Edgerton, *The Mirror, the Window, and the Telescope: How Renaissance Linear Perspective Changed Our Vision of the Universe* (Ithaca, NY: Cornell University Press, 2009), 151-167.

³¹⁹ Roland Penrose, "Max Ernst *Histoire naturelle*," in *Max Ernst's Histoire naturelle* (London: Arts Council of Great Britain, 1982), n.p.

appropriation of cosmic phenomena. He writes, “We may well ask how Ernst conceived a panorama of the universe so unorthodox and yet containing an authentic stab of truth.”³²⁰ Ernst’s work, both in this series and in other works from the era, was not illogical or without scientific precedence. Instead Ernst integrated sources into his work with an appreciation for the implied scientific content but also managed to create his own strange Surrealist science in the process.

The inclusion of astronomical imagery in *Histoire naturelle* marked Ernst’s earliest combination of Surrealist techniques with his interest in the cosmos. In the succeeding decades of his career, he continued to populate his creative output with references to such themes. Between 1925 and 1927, Ernst entered one of his most prolific years of artistic production. In 1927 alone, he made in excess of two hundred new works.³²¹ Early works from this period, such as *La Mer* [*The Sea*] from 1925 [fig. 30], reveal a similar reliance on the circular forms used in images from *Histoire naturelle*. A multi-ringed object, centered in a hazy blue and orange sky, watches over the seas below. The broken circular forms and multiple textures seen in *Un Coup d’oeil* or *Petites Tables autour de la terre*, have been replaced by concentric circles, carefully outlined. A large white ring, filled with black linear divisions encircles a dark orange ring. The center of the form is a light blue circle. These ringed forms evoke a visual

³²⁰ Penrose, “Max Ernst *Histoire naturelle*,” n.p.

³²¹ For a discussion of this extremely fertile year of artistic production, see Walter Hopp, “Ernst at Surrealism’s Dawn 1925-1927,” in *Max Ernst: Dada and the Dawn of Surrealism*, ed. William A. Camfield (Munich: Prestel, 1993), 157-159. Reproductions of much of the work from this period can be found in volume three of the seven volume catalog raisonné. See Werner Spies, Sigrid Metken, and Günter Metken, *Max Ernst, Oeuvre-Katalog*, vol. 3 (Houston: The Menil Foundation, 1976).

relation not just with simple planetary bodies but also with astronomical diagrams and illustrations. As Charlotte Stokes has shown in her analysis of Ernst's earlier 1922 painting *Au Rendez-vous des amis* [*Meeting of the Friends*] [Fig. 31], the artist used an 1892 illustration of solar halo formations, or the atmospheric diffraction of light from either the sun or the moon that optically appears as a number of small concentric rings around the celestial object.³²²

These ringed, circular bodies also bear a striking resemblance to late nineteenth-century solar eclipse photographs and composite drawings, which captured the corona and solar prominences during the moon's occultation of the sun.³²³ Ernst likely would have encountered similar images in the pages of *La Nature* and other nineteenth-century print sources used for his earlier collage work. Eclipses were also the stuff of recent headline news. A total eclipse on May 29, 1919 provided astronomer Sir Arthur Eddington with the visual proof of one of the implications of Einstein's theory of relativity.³²⁴ Moreover, on January 24, 1925, early in the same year in which these concentric ringed forms began to appear in Ernst's work, a total solar eclipse was

³²² Stokes, "The Scientific Methods of Max Ernst," 456. These halo formations are also known as coronas. This feature is distinct from the sun's corona, the outermost, plasma-filled layer of the solar atmosphere observable during an eclipse.

³²³ For a discussion of these eclipse images, see Pang, *Empire and the Sun*, 82-120. In her study of Ernst and alchemy, M.E. Warlick has also identified these ringed objects seen in his paintings as representations of eclipses. Warlick rightly contends that Ernst included such references in keeping with his fascination with alchemy. In alchemical illustrations and texts, an eclipse, the astronomical conjunction of the sun and moon, serves as a metaphor for the chemical union. See Warlick, *Max Ernst and Alchemy*, 74-75 and 191-194.

³²⁴ These eclipses were only visible in the southern hemisphere and led astronomers to dense tropical locales in search of optimal viewing conditions. As Warlick points out, this may have led to Ernst to feature his eclipse imagery in compositions with forest or jungle-like settings. See Warlick, *Max Ernst and Alchemy*, 192-193.

observed in Paris. The French popular science periodical *Je Sais Tout* prepared readers for the event in their January issue with an article that explained the phenomenon and the way times and regions of visibility are predicted; multiple diagrams, including illustrations of the solar corona, complemented the text.³²⁵ The event also dominated the front pages of Paris newspapers the day after. Paris' *Le Petit Journal* decried poor weather and cloudy conditions that yielded poor viewing conditions in Paris.³²⁶ The eclipse was also front page news in *Le Petit Parisien*, which detailed the viewing efforts of astronomers in England and the United States.³²⁷

Such coverage of eclipses in the popular scientific press, with which Ernst was certainly familiar, provides a context for the artist's incorporation of ringed forms in works made between 1925 and 1927. These forms became a near constant addition to Ernst's series of forest paintings. Produced using his newly invented grattage technique, the works are marked by a repeated inclusion of dark, towering wooded areas, often seemingly impenetrable.³²⁸ Strange plant-life and birds also populate these imagined environments. In *La Forêt* [*The Forest*] from 1926 [Fig. 32], Ernst fills his canvas with dark towering tree forms with a blue, cloudy sky in the background. A red, ringed form

³²⁵ "L'Éclipse de soleil du 24 Janvier," *Je Sais Tout: La Grande Revue de vulgarization scientifique*, 227 (January 1925), 36-37.

³²⁶ "Dans un ciel boudeur l'éclipse partielle...fut totale," *Le Petit Journal*, January 25, 1925.

³²⁷ "Seule, une partie des États-Unis a pu observer l'éclipse de soleil," *Le Petit Parisien*, January 25, 1925.

³²⁸ Grattage is a relief process that the artist invented as a means to allow for automatic procedures in painting. Ernst first primed a canvas with thick, rich layers of pigment and then lay it directly on top of various materials—wood, wire, broken glass, etc. He scraped away layers of paint using a palette knife in order to reveal the textures below.

appears in the sky, just behind his forest. In *La grande forêt* [*The Large Forest*] from 1927 [Fig. 33], Ernst again renders dense, intimidating vegetation, this time with a gray ominous skyline. The ringed eclipse image, now golden in color, is positioned just beyond the tree line. Ensnared within the forest is an incised image of a bird, a common self-referential symbol in the artist's oeuvre, as noted earlier.³²⁹ Similar to the Surrealist use of automatism as a means to access the unknown realm of the unconscious mind, solar eclipses allow scientists to study otherwise unobservable features of the sun such as the corona.

During the turbulent years of World War II, Ernst was one of several Surrealists who managed to escape Europe and to find a new home in the United States. Not long after his arrival, Ernst met Dorothea Tanning, a young American artist whom he would later marry in 1946.³³⁰ In 1942 the pair moved from New York to Sedona, Arizona. Tanning's doctor had suggested relocating to a dry climate because of health concerns.³³¹ Ernst built a home for the couple in a relatively unsettled portion of desert. He felt newly

³²⁹ Ernst created the character Loplop, The Bird Superior as a fantastic alter ego and often inserted birds within his works as a type of self-portrait or self-reference. For more on Ernst's development of the Loplop character, see Samantha Kavky, "Authorship and Identity in Max Ernst's Loplop," *Art History* 28 (June 2005): 257-285; and Eduard Trier, "Homage to Loplop: Variations on a Theme by Max Ernst," in *Homage to Max Ernst*, ed. G. di San Lazzaro (New York: Tudor Publishing, 1971), 34-39. *Homage to Max Ernst*, like the similarly titled *Homage to Joan Miró* was a reprinting of a special issue of the *XX^e Siècle*.

³³⁰ The two were wed on October 24, 1946 in Beverly Hills. The wedding was a double ceremony with Man Ray and Juliet Browner. Ernst would spend the rest of his life with Tanning. For more on Tanning, see Jean Christophe Bailey and Robert C. Morgan, *Dorothea Tanning* (New York: George Braziller, 1995); Whitney Chadwick, *Women Artists and the Surrealist Movement* (New York: Thames and Hudson, 1985), 92-95; and Dorothea Tanning, *Between Lives: An Artist and Her World* (New York: W.W. Norton and Company, 2001).

³³¹ Patrick Waldberg, "Max Ernst in Arizona," in *Homage to Max Ernst*, ed. G. di San Lazzaro (New York: Tudor Publishing, 1971), 55.

inspired by his new home in the southwest, and drew upon both the landscape and Native American culture in works produced in the years after their relocation. In this remote rural environment, Ernst also had unimpeded views of the night sky. He recounted his pleasure-filled nights spent staring up at the sky in a later interview:

At night, on the embankment we used as a terrace, silence lapped over us in waves, broken from time to time with the suddenness of crystal shattering on marble by the chirring of an insect, the cry of a wildcat, or the almost human hooting of the horned owl. In the transparent night sky, the stars seemed close and more twinkling than usual, as their milky glow caressed the contour of the tall trees or outlined the dark mass of giant rocks frozen into phantom cities for eternity.³³²

Ernst was not alone in his appreciation for the celestial views offered by the desert setting in Arizona. This area of the American Southwest had long been prized for its excellent astronomical viewing conditions. In 1894, American astronomer Percival Lowell located his research institution and observatory in nearby Flagstaff, a mere thirty miles north of Ernst's onetime Sedona home.³³³

During his time spent in Arizona, Ernst continued to produce work that referenced his astronomical interests. Some, like his large sculptural work *Capricorne* [Fig. 34], reflected his interest in astrology.³³⁴ Other work from the period demonstrates the recurrence of celestial features in his compositions. His *Colline inspirée* [*The Inspired*

³³² Waldberg, "Max Ernst in Arizona," 55.

³³³ Opened in 1955 after Ernst had returned to Paris, the United States Naval Observatory is also located in Flagstaff. Other nearby and more recently built observatories in the area include the Embury-Riddle Observatory in Prescott, approximately sixty miles southwest of Sedona.

³³⁴ *Capricorne* is not the only sculpture by Ernst with a title that referenced astronomical subjects. In 1935 he produced *Les Asperges de la lune* [*Lunar Asparagus*]. Other works from the 1940s also depicted cosmic creatures whose bodies were fashioned from heavenly objects, including *Moonmad* (1944) and *Jeune femme en forme de lunes* [*Young Woman in the Shape of Moons*] (1944).

Hill] from 1950 [Fig. 35] documents the awe-inspiring Arizona landscape, complete with a blazing yellow sun.³³⁵

Despite his love of his Sedona cabin, Ernst returned to Paris in 1953. Much of the work produced over the next two decades reveal a continued fixation on astronomical subjects. The greatest example of this was his artist's book *Maximiliana ou l'exercice illegal de l'astronomie*, which was dedicated to nineteenth-century astronomer Ernst Wilhelm Leberecht Tempel.

An unsung scientific hero, Tempel was scarcely remembered in the history of astronomical discovery, despite both his prolific record of finding new comets, minor planets, and other heavenly bodies and his working association with major observatories and astronomers in France and Italy.³³⁶ Born in Germany in 1821, Tempel had little to no academic training in astronomy and was a self-taught enthusiast. He embarked upon a career as an amateur astronomer after training in lithography. He made his first major discovery in 1859, the comet 1859 G1. Soon after, in 1860, Tempel moved to Marseilles, finding work as a lithographer but also assisting at the observatory. Not long after his arrival in Marseilles, the astronomer suffered his first major career-related

³³⁵ In their evaluation of his use of scientific themes in his oeuvre, scholars Jessica Dallow, Colleen Thomas, and Barbara Matilsky go so far as to suggest that the landscapes Ernst created while in Arizona resembled a view of some "strange, visionary planet" or the imagery seen in fantasy and science fiction texts. See Jessica Dallow, Colleen Thomas, and Barbara Matilsky, *From the Molecular to the Galactic: The Art of Max Ernst and Alfonso Ossorio* (Chapel Hill, NC: Ackland Art Museum, 2000), 12.

³³⁶ In an appendix to their history of Comet 9P/Tempel 1 Donald K. Yeomans, Jon D. Giorgini and Steven R. Chesley provide an excellent condensed biography of Tempel. See Donald K. Yeomans, Jon D. Giorgini, and Steven R. Chesley, "The History and Dynamics of Comet 9P/Tempel 1," *Space Science Reviews* 117 (2005): 123-135. See also Lutz Clausnitzer, *Wilhelm Tempel und seine kosmischen entdeckungen* (Berlin: Archenhold-Sternwarte Berlin-Treptow, 1989).

disappointment. In March 1861, Tempel discovered two minor planets, large asteroids located in the outer belt between the orbits of Mars and Jupiter. When Tempel submitted names for his two discoveries he proposed Angelina, a reference to a nearby astronomical station, and Maximiliana, in honor of Maximilian II, King of Bavaria. However, prominent astronomers were appalled by Tempel's break from the tradition of using mythological names for minor planets and asteroids.³³⁷ Maximiliana was soon changed to Cybele.

Tempel's next great disappointment came with his expulsion from France in early 1871 during the Franco-Prussian war. He settled briefly in Milan, working as an assistant to Giovanni Schiaparelli at the Brera Observatory. In 1874, his efforts were temporarily rewarded when he was appointed as assistant in charge of the newly founded Arcetri Observatory, located near Florence. However, this opportunity was short-lived. Funding for the site waned, and Tempel spent the remaining fifteen years of his life subsisting on a meager salary with no funds to finish work on two refracting telescopes planned for the observatory. Nonetheless, he continued to observe and record a number of important heavenly features.

In 1964 Ernst joined forces with longtime acquaintance Iliasz to publish a book on the subject of Tempel. Iliasz, the pseudonym of Ilia Zdanevitch, was a Russian-born publisher and innovator in typography who settled in Paris in 1921. Prior to his move to

³³⁷ According to Yeomans, Giorgini, and Chesley, English astronomers John Herschel and George Airy were among those astronomers most offended by Tempel's name-related faux-pas and insisted on renaming the asteroid. See Yeomans, Giorgini, and Chesley, "The History and Dynamics of Comet 9P/Tempel 1," 134.

Paris, Iliazd had been affiliated with the Russian Futurist movement.³³⁸ Ernst likely first met Iliazd not long after his own arrival in the city in 1922. By 1930, Iliazd had established his own publishing company in Paris. He used the press as a means to explore not only his own inventive ideas in graphic design and typography, but also to publish and re-publish texts that might not otherwise see printing.³³⁹ He relied upon his avant-garde artists friends for the illustrations for his texts.³⁴⁰

While Iliazd first initiated the project, both men were clearly enthusiastic about the possibility of celebrating the work and career of Tempel, a man whom they both revered. As scholar Anne Hyde Greet has suggested, Ernst felt particularly drawn to Tempel because of their shared histories.³⁴¹ Both Ernst and Tempel were German by birth, both spent their lives living and working in other parts of Europe, and both had been victims of wartime displacement. In a later interview, Ernst noted Tempel's

³³⁸ For more on Iliazd's biography and his work in illustrated books, see Audrey Isselbacher and Françoise Le Gris-Bergmann, *Iliazd and the Illustrated Book* (New York: The Museum of Modern Art, 1987).

³³⁹ Anne Hyde Greet refers to Iliazd's publication of unsung literary figures and long forgotten texts as "rescue operations." He published without concern for commercial success or profit. This included texts by unrecognized contemporaries, such as Raoul Hausmann, as well as long forgotten writers of the past, such as seventeenth-century authors René Bordier and Adrian de Monluc. See Anne Hyde Greet, "Max Ernst and the Artist's Book: From *Fiat modes* to *Maximiliana*," in *Max Ernst, Beyond Surrealism: A Retrospective of the Artist's Books and Prints*, ed. Robert Rainwater (New York: The New York Public Library, 1986), 127. Greet also discusses these issues in a shorter article on *Maximiliana* from 1982. See Anne Hyde Greet, "Iliazd and Max Ernst: 65 *Maximiliana* or the Illegal Practice of Astronomy," *World Literature Today* 56 (Winter 1982): 10-18.

³⁴⁰ Miró also illustrated texts for Iliazd. Other artists, who collaborated with the publisher, included Picasso, Georges Braque, Giacometti, and Marc Chagall. For more on Iliazd's collaboration with Picasso, see Mary E. Murray, "Picasso's Illustrations for Iliazd in Context," *Athanor* 8 (1989): 53-63.

³⁴¹ Greet, "Max Ernst and the Artist's Book," 96. Werner Spies notes that Ernst had also previously produced imagery related to Tempel. A 1931 collage work, entitled *A l'Intérieur de la vue* [A View of the Interior], took Tempel's *Maximiliana* as its subject. The collage was later published in 1946 with a text by Paul Eluard. See Werner Spies, *Max Ernst, 1950-1970: The Return of La Belle Jardinière* (New York: Harry N. Abrams, Inc., 1971), 96.

diligence to continued exploration and discovery despite being “refused recognition by the astronomers, who believed themselves to be in possession of the exclusive rights to the firmament.”³⁴² As Ernst recalled, conditions in Germany during his youth were quite similar, with science heralded as the exclusive domain of educated practitioners. Given his own amateur engagement with science over the course of his artistic career, Ernst certainly would have felt a kinship with this non-professional.

In preparation for the project, Iliazd tracked down notes, original poems and lithographic star maps produced by Tempel for reproduction in the text. These original passages accompanied Ernst’s etchings and Iliazd’s innovations in type and layout.³⁴³ The resulting book was composed of thirty leaves, folded to allow for double folio pages. Ernst’s images take Tempel’s notes and observations as a starting point, translating the celestial bodies of his observations into simple yet evocative forms reminiscent of his earlier distillation of astronomical features, such as the eclipse imagery seen in paintings from the later 1920s.

In Folio five, strange spherical shapes are rendered over a flecked ground reminiscent of the starry expanses of interstellar space [Fig. 36]. This configuration

³⁴² This quote is taken from Ernst’s commentary in the Peter Schamoni film *The Illegal Practice of Astronomy*. See Peter Schamoni, *Max Ernst, Maximiliana*, 84.

³⁴³ Greet provides an excellent analysis of Iliazd’s various typographic innovations used in the text. These included the publisher’s previous advances such as the use of all capital letters and variable spacing techniques (Iliazd chose letter spacing based not on some preconceived, repeated spacing but instead sought to stress verbal context via spacing choices), as well as new experiments in layout like his use of “construction en carré” wherein text is rendered in a series of square shaped layouts in an effort to give the text and the page a three-dimensional effect. See Greet, “Max Ernst and the Artist’s Book,” 127-155. For further analysis of Iliazd’s work in typography and design, see Johanna Drucker, “Iliazd and the Book as a Form of Art,” *Journal of Decorative and Propaganda Arts* 7 (Winter 1988): 36-51.

mimics the planetary bodies seen in his earlier *Petites Tables autour de la terre* from *Histoire naturelle*. Accompanying Ernst's imagery, Iliasz artfully incorporates a passage from Tempel on the facing page: "Invisible a l'oeil nu elle paraissait dans sa famille etre la plus éloignée du soleil" [Invisible to the naked eye it appeared farthest in its family from the sun]. The publisher lays out the text as single words arranged in a dizzying descent down the page creating a visual impression similar to the interstellar distance evoked in the quotation. Ernst's imagery has a similar effect. As Anne Hyde Greet proposes, the use of blue-grey tones to create the star flecked ground against the beige page creates a similar spatial presence.³⁴⁴ Ernst created this starry field using experimental printing techniques. He allowed dust and other matter to gather on the etching plate and then also carefully controlled the flow of ink during the printing process in order to create a flecked appearance. This process, partially controlled but obviously reliant on unplanned occurrences, marked Ernst's continued dedication to automatic processes.

Ernst also created various visual evocations for the nebulae that Tempel searched for in the heavens. For folio fifteen [Figs. 37 and 38], Iliasz chose a passage from Tempel's notes detailing various observational impediments and atmospheric conditions encountered while searching for new nebula formations. Tempel makes specific mention of a roiling fog that billowed to form strange shapes. Using a series of quick, brush-like marks etched in a light blue-green shade, Ernst captures these conditions. On the left of

³⁴⁴ Greet, "Max Ernst and the Artist's Book," 135-136.

the folio, a looping, dark outline suggests the strange formations created by this cloudy disturbance. At left, Ernst includes a simplified human outline, perhaps Tempel himself, and a large coiling spiral, a reference to the nebulae that the astronomer hoped to record. During Tempel's career in the later nineteenth century, astronomers still considered spiral star formations to be another class of nebulae. In the 1920s astronomers at the Lick and Mt. Wilson observatories had debated whether or not these formations might instead be galaxies. Edwin Hubble confirmed this theory in 1926 with his observations of the Andromeda Galaxy.³⁴⁵ This effectively made the term spiral nebula an outmoded term, uniquely linked to later nineteenth-century astronomy. Ernst, by rendering the nebula as a spiral, seems conscious of this tendency and chooses to depict the form in keeping with the science of Tempel's era. Ernst incorporates similar spirals throughout the text. Most notably, a spiraling formation appears in folio seventeen to accompany Tempel's notes on nebulae [Fig. 39].

In folio seven [Fig. 40], Ernst also evokes the imagery of nebulae and their discovery, but rather than include the simple spiral form, Ernst depicts an ill-defined, abstracted form similar to an hourglass or a figure eight. The choice to include this strange shape documents Ernst's understanding of the various types of nebulae formations, including diffuse nebulae, which have no clear boundaries and appear irregular in shape. The strange glowing form evokes early experiments in spectroscopy and the luminous gases described in nebula observations from the later nineteenth

³⁴⁵ For more on Hubble's work and his observations of the Andromeda Galaxy, see David A Schultz, *The Andromeda Galaxy and the Rise of Modern Astronomy* (New York: Springer, 2012).

century. Moreover the bright white forms against the black dappled ground bears a striking resemblance to early photographic applications for nebula observation such as images produced by another amateur astronomer, American Henry Draper, in 1880 [Fig. 41].³⁴⁶

Perhaps Ernst's strangest and yet most inventive addition to the imagery and pages of *Maximiliana* was what scholar Werner Spies has termed his "cipher writing."³⁴⁷ Ernst had recently developed a secret language of hieroglyphic symbols. He first used these in imagery for a catalog of work by Unica Zürn from 1962. The ciphers dominate folios ten and twelve [Fig. 42], but they are also incorporated throughout the text. If read as a hieroglyph, this invented language bears some basic relation to occultist preoccupations with ancient Egyptian origins, which Ernst would have been aware of, given the greater Surrealist interest in occultism. But in a text on the triumphs of interstellar observation and discovery, Ernst here has rendered a glyphic mode of cosmic communication, a series of forms meant to communicate his own mysterious message to someone or something in the far reaches of space that Tempel visually explored and documented. Ernst incorporated these same glyphic forms in an oil on canvas work from 1965, *Le monde des naïfs* [*The World of the Naïve*] [Fig. 43]. Here Ernst mixes his long-used planetary spheres and shapes with this newer mode of glyphic text. The space of the

³⁴⁶ Draper was the first to adapt dry plate technology for astrophotography. One of his earliest and most widely produced images was an 1880 photograph of the Orion Nebula, which features similar abstract, glowing forms against the dark expanse of interstellar space. For more on the first photographs of nebulae, see Owen Gingerich, *The Great Copernicus Chase and Other Adventures in Astronomical History* (New York: Cambridge University Press, 1992), 184-188.

³⁴⁷ Spies, *Max Ernst, 1950-1970*, 96-98.

picture plane is shattered into overlapping polygonal panels, creating the visual effect of deep space. In such a work, the mysterious content of his ciphers is only matched by the unknown realms of the universe.

As noted at the start of this chapter, Ernst himself spoke of the prominence of astronomical themes in his oeuvre and the hidden wonders of the astronomical realm. In the light of this chapter's discussion his specific references are telling:

The significance of suns, moons, constellations, nebulae, galaxies and space as a whole outside the earth zone have steadily taken root during the last century in human consciousness as well as in my work, and it will most probably remain there.³⁴⁸

For Ernst, astronomy was a lifelong fascination and one which he shared with the greater public. The cosmos, as he noted, was a space of continual revelations, a realm that necessitated exploration. The universe beyond our terrestrial existence was an observable yet not fully understood realm—in Ernst's words "another equally wonderful world." This seems similar to the veiled realms of the unconscious. Thus, cosmic discovery might serve as a metaphor for the Surrealist quest to access the unconscious. These themes were also investigated by later second-generation Surrealists, who suggested a similar metaphoric relation between space exploration and the unconscious. These issues will be discussed at length in Chapter Four.

Both Ernst and Miró showed a lifelong appreciation for astronomy and used cosmic themes in their creation of the types of fantastic imagery most associated with Surrealist visual expression. What set their work apart was their reliance on simple,

³⁴⁸ Schamoni, *Max Ernst, Maximiliana*, 5.

instantly recognizable representations of heavenly bodies. From Miró's ever present orbs and constellated starscapes to Ernst's eclipses and nebulae, both men created a visual lexicon of signs to document astronomical features. Moreover, their work created an early link between astronomy and Surrealism, encouraging later Surrealists to explore similar themes in their works.

Chapter 4

Outer Space/Inner Space: Surrealist Understandings of Interstellar Space

The fact that the young painters of today have opted unequivocally for automatism has by no means precluded them from devoting their fullest attention to the most far-ranging problems. Though, in their forays into the realm of science, the accuracy of their pronouncements remains largely unconfirmed, the important thing is that they all share the same deep yearning to transcend the three-dimensional universe. Although this particular question provided one of the leitmotifs of cubism in its heroic period, there is no doubt that it assumed a greatly heightened significance as a result of Einstein's introduction into physics of the concept of the *space-time continuum*.—André Breton, "The Most Recent Tendencies in Surrealist Painting"³⁴⁹

In his 1928 essay "Surréalisme et la peinture," André Breton provided a definition for Surrealist art and accounted for its role in the longer history of twentieth-century art. His essay also identified a first generation of artists, including Miró, Ernst, Tanguy, Man Ray, and Masson, who established the visual appearance and techniques of Surrealist art. By the mid-1930s the Surrealist movement experienced a period of marked growth in membership, as a new second-generation of Surrealists looked to expand the movement's visual and ideological premises. These artists devised new modes of visual production, which remained faithful to the automatic and psychoanalytic origins of the movement, while also expanding its repertoire of visual motifs and subject matter.

³⁴⁹ André Breton, "The Most Recent Tendencies in Surrealist Painting," in *Surrealism and Painting*, trans. Simon Watson Taylor (Boston: MFA Publications, 2002), 148. This essay originally appeared in the Surrealist journal *Minotaure*. See André Breton, "Des Tendances les plus récentes de la peinture surréaliste," *Minotaure* 12/13 (May 1939), 16-17.

Given this influx of new personalities and approaches, Breton felt compelled to update his earlier assessment of Surrealist art, producing his 1939 essay “Des Tendances les plus récentes de la peinture surréaliste” [The Most Recent Tendencies in Surrealist Painting]. Breton applauded this younger generation’s commitment to automatic practice but also recognized their reliance on a whole new set of “far-ranging” sources.³⁵⁰ Among these, Breton chose to highlight the significance of Einstein and the new physics for these young Surrealists. As a result, he also stressed the continued importance of astronomical themes in the visual production of Surrealism.

This chapter examines work from this era that addresses the idea of cosmic space. In the paintings of second- generation Surrealists, conceptions of outer space took one of two forms. On the one hand, Einstein’s Theory of Relativity and related conceptions of the space-time continuum offered a new creative means to explore the marvelous. In their imagery, Matta, Wolfgang Paalen, Remedios Varo, Oscar Domínguez, and even Max Ernst provided a Surrealist vision of these highly scientific understandings of space. In particular, Matta’s series of psychological morphologies reveals a conflation of the new physics and the unconscious. On the other hand, others among the Surrealists depicted space by evoking extraterrestrial life and the dream of interplanetary travel. This tendency can best be seen in the work of Matta, Paalen, and Domínguez. In conceptualizing this more fantastic version of space, these artists certainly drew upon the science fiction and films already addressed in Chapter One. However, their conception

³⁵⁰ Breton, “The Most Recent Tendencies,” 148.

of extraterrestrial worlds was also linked to the Surrealist appreciation of nineteenth-century contributors to the history of extraterrestrial inquiry, such as Charles Cros and Théodore Flournoy.

In highly inventive canvases from the later 1930s and beyond, the uncharted terrain of outer space emerged as a metaphor for the still unfamiliar domain of the unconscious. Whether in keeping with the latest findings in physics or the often inventive domain of extraterrestrial life, outer space became a recurring stand-in for the inner space of the mind. As such, this imagery suggests a symbolic parallel between the exploration of interplanetary space and the Surrealist quest to access the unconscious.

SURREALISM, EINSTEIN, AND THE SPACE-TIME CONTINUUM

Scholar Gavin Parkinson has done much to facilitate an understanding of the connections between Einstein's Theory of Relativity, the concurrent development of quantum physics, and Surrealism. As Parkinson sees it, his study is not simply based in coincidence. He also rejects previous, more simplistic comparisons of Einstein's ideas and Surrealist visual production that suggested that the "weirdness" of physics in the 1930s was what most attracted the Surrealists as they looked for new subjects for their wild, imaginative paintings.³⁵¹ Rather, he argues for a specific history of the reception of these ideas by both French intellectuals and Surrealists. Moreover, Parkinson contends

³⁵¹ In a brief portion of a longer chapter on Surrealism and science, Lynn Gamwell posits just such a relationship to express Surrealism's connection to Einstein and his theories. See Gamwell, *Exploring the Invisible*, 252.

that both Surrealism and the new physics expressed an “epistemological radicalism” in their questioning of earlier and longstanding concepts and knowledge.³⁵²

Parkinson provides a meticulous and comprehensive history of the reception of the new physics in France. As a result, to repeat this information at length in this dissertation is neither original nor necessary. I wish instead simply to summarize some of his key points and highlight specific visual instances of Surrealist engagement with the scientific findings in physics in the 1930s.

As established by Linda Henderson in her lengthy study of artist engagement with the spatial fourth dimension and non-Euclidean geometries, the French public was not aware of Einstein’s theories prior to 1919.³⁵³ Following Eddington’s confirmation of the General Theory of Relativity that year, however, popular audiences had access to Einstein and his proposals in a huge number of articles and books on the topic, not to mention the eventual translation of Einstein’s original texts. Parkinson takes this moment as his starting point, compiling a history of French journals, scientists, philosophers, and science popularizers that had the greatest impact on public conceptions of Einstein and related contemporary findings in physics. Of primary importance for Surrealist engagement with these ideas in France were the publications and efforts of philosopher Gaston Bachelard and physicist Louis de Broglie. Moreover, the popularization of Relativity Theory in works such as Arthur Eddington’s *Space, Time and Gravitation*

³⁵² Parkinson, *Surrealism, Art, and Modern Science*, 11.

³⁵³ See “Appendix A: The Question of Cubism and Relativity” in Linda Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art* (Cambridge: The MIT Press, 2013), 512-521.

from 1920 and James Jeans' *The Mysterious Universe* from 1930 made the often challenging content of academic journals and Einstein's original texts into accessible content for a wide readership. The works of both Eddington and Jeans were translated into French and readily accessible to the Surrealists.³⁵⁴

Against this backdrop of Surrealist engagement with Einstein's Theory of Relativity and related conceptions of space, Surrealist artists, most notably those who joined the movement in the mid-1930s, all proposed inventive new ways to creatively render these contemporary notions of our universe. Ernst and Varo produced images that, while inventively rendered, only evinced a cursory or popular understanding of Einstein's Space-Time Continuum and a universe portrayed in keeping with to the Theory of Relativity. Yet others, such as Domínguez, Paalen, and Matta, were more resolute in their study and understandings of such theories, often expressing their deep indebtedness to the new physics in essays about the value of science as a subject for art. Moreover, Matta and Domínguez both suggest that these visualizations of deep space can serve as a visual stand-in for the Surrealist interest in the unconscious mind.

During his exile in the United States during World War II, Ernst began to experiment with new ways to render the terrain of space without the use of the archetypal shapes seen in his earlier oeuvre. At the same time, Ernst was also experimenting with new modes for automatic art production. The resulting technique of oscillation visually

³⁵⁴ Parkinson documents the Surrealist interest in both of these texts and provides a more systematic discussion of Georges Batailles' engagement with Eddington. See Parkinson, *Surrealism, Art, and Modern Science*, 130-144.

anticipates the dripped skeins of paint seen in Jackson Pollock's first drip paintings later in the decade. Ernst explained,

Tie a piece of string, one or two metres long, to an empty tin can, punch a small hole in the bottom and fill the tin with thin paint. Then lay the canvas flat on the floor and swing the tin backwards and forwards over it, guiding it with movements of your hands, arms, shoulders and your whole body. In this way surprising lines will drip on to the canvas. Then you can start playing with free associations.

As Ernst insists, this was at its heart an automatic technique, but the surprising forms that appeared in his *Bewildered Planet* of 1942 [Fig. 44] suggested the irregular movements of planets through space-time. Paralleling his use of this same technique in his earlier canvas *Head of a Man Intrigued by the Flight of a Non-Euclidean Fly* from that same year [Fig. 45], Ernst suggests the orbits of planets via an indexical, automatic line. The canvas is divided into two panels. On the left, a clear, elliptical line portrays the regular motion of planets seen in earlier astronomy. In contrast, on the right, the “bewildered” orbits are rendered as a line that stops and starts jerkily across the canvas, disturbed by the non-Euclidean space-time of Relativity.

Spanish-born artist Remedios Varo first joined with the Paris Surrealists in 1937 but did not truly develop her own unique visual language until after she resettled in Mexico during World War II.³⁵⁵ While much of Varo's oeuvre is concerned with occult

³⁵⁵ For more on Varo, see Peter Engel, “The Traveler,” *Connoisseur* 218 (February 1988): 94-99; Janet A. Kaplan, “Remedios Varo: Voyages and Visions,” *Women's Art Journal* 1 (Autumn 1980-Winter 1981): 13-18; Janet A. Kaplan, *Unexpected Journeys: The Art and Life of Remedios Varo* (London: Virago Press Limited, 1988); Luis-Martin Lozano, *The Magic of Remedios Varo*, trans. Elizabeth Goldson and Liliana Valenzuela. (Washington D.C.: National Museum of Women in the Arts, 2000); Alberto Ruy Sánchez, et al., *Five Keys to the Secret World of Remedios Varo*, ed. Margarita de Orellana, trans. Lorna Scott Fox, Richard Moszka, and Quentin Pope (Mexico City: Artes de Mexico, 2008); Sue Taylor, “Into the Mystic,” *Art in America* 89 (April 2001): 126-129, 159.

matters, Varo also exhibited a strong interest in science, equally valuing the work of astronomical popularizers and science fiction.³⁵⁶ Her interests in Einstein and the then popularly understood fourth dimension of space-time were also likely influenced by her readings in occult literature, particularly as expressed by P. D. Ouspensky in publications such as his 1911 *Tertium Organum*.³⁵⁷

Varo's depictions of an Einsteinian cosmos were as eclectic as the range of texts she read. Her *Fenómeno de ingravidez* [*Phenomenon of Weightlessness*] (1963) [Fig. 46] depicts an orrery floating in front of a man. The position of his arms suggests that he has some power over the rotating orbs before him. The strange tilting room with incomprehensible walls along with the man's frizzy, tousled hair may acknowledge Einstein and his Relativity Theory. The painting reflects a magical or occult realm in which science is mixed with the fantastic.³⁵⁸ An equally inventive image of space-time can be found in Varo's earlier painting *Tejido espacio-tiempo* [*Weaving of Space and Time*] (1954) [Fig. 47]. An interior scene, featuring a small room with two mechanical

³⁵⁶ Scholar Peter Engel notes that Varo was equally comfortable reading the dystopic science fiction of Aldous Huxley as she was the popular science tracts of British astronomer Peter Hoyle. Most notably, Hoyle positioned himself against Big Bang theorists such as Hubble—Hoyle even termed the phrase Big Bang to describe the supposed, expanding universe—and instead supported the steady state theory of the universe. His radio talks for the BBC, recorded in 1949, were later published as *The Nature of the Universe*. In addition to his work as an astronomical popularizer, Hoyle published science fiction. See Peter Engel, *Science in Surrealism: The Art of Remedios Varo* (New York: The New York Academy of Sciences, 1986). See also Bowler and Morus, *Making Modern Science*, 292-293.

³⁵⁷ Sanchez, et al., *Five Keys to the Secret World of Remedios Varo*, 12. For more on Ouspensky and historic conceptions of an occult fourth dimension, see Henderson, *The Fourth Dimension*, 377-386.

³⁵⁸ This reading of Varo's painting is indebted to a similar analysis by Janet A. Kaplan. See Kaplan, *Unexpected Journeys*, 177. According to Kaplan (in conversation with Varo's last husband, Walter Gruen), United States astronauts contacted Varo to tell her that she had quite accurately depicted the phenomenon of weightlessness in space as they had experienced it.

humans, is overlaid with a strange, curved woven fabric, its warp and weft easily visible. Here, Varo responds to the idea of the fabric of space-time and the mathematical models used to show the curvature of space as a curving, geometric grid. In these images, Varo puts her own fantastic spin on the ideas of the new physics and at the same time displays her intense interest in astronomy.

Breton first invited Austrian artist Wolfgang Paalen, who had been living in France since 1934, to exhibit with the Surrealists in the 1936 International Exposition of Surrealism.³⁵⁹ In 1939, Paalen sought exile in Mexico, eventually severing his ties with Surrealism. In work from around this same time, often identified as his Cosmic Paintings, Paalen began to experiment with visual modes for the depiction of discoveries made in physics in the wake of Einstein. As Parkinson contends, these motivations are recorded in a passage from Gustav Regler's 1946 biography of the artist, which the artist helped write:

Already at the end of 1939, [Paalen] had painted a series of goauches in which a new concept of space was announced by strange figures formed by the vibration of spiraloid rays of colour. Since 1939, he has been concerned with the philosophical implications of post-Einsteinian physics "in order to find out what is right with science and why it works—and what is wrong with art in our time and why it does not work."³⁶⁰

³⁵⁹ For more on Paalen, see Nora Halpern, *Dynaton Before and Beyond: Works by Lee Mullican, Gordon Onslow Ford and Wolfgang Paalen* (Malibu: Pepperdine University, 1992); Wolfgang Paalen, *Wolfgang Paalen: Implicit Spaces* (San Francisco: Frey Norton Gallery, 2007); Gustav Regler, *Wolfgang Paalen* (New York: Nierendorf Editions, 1946); and Amy Winter, *Wolfgang Paalen: Artist and Theorist of the Avant-Garde* (New York: Praeger, 2002).

³⁶⁰ Regler, *Wolfgang Paalen*, 41. See also Parkinson, *Surrealism, Art, and Modern Science*, 157.

Paalen was invested in exploring visual modes of depicting space in keeping with Einstein's theories. In doing so, he used lush washes of color, meant to invoke the landscape of deep space as seen through the lens of modern physics. This can best be seen in his painting *Space Unbound* (1941) [Fig. 48]. Here Paalen gives us what is at once a more imaginative and yet highly scientific vision of the fabric of space-time seen in Varo's work. Instead of the literal representation of woven fabric, Paalen shows space as a complex, writhing series of ripples and motion. Parkinson relates these forms to Louis de Broglie's *Matière et lumière* from 1937 in which the physicist posited his Wave Mechanics, a theory that combined wave and particle physics.³⁶¹ The artist would continue to demonstrate an interest in astronomical topics in the journal *Dyn*, which he published between 1942 and 1944 while in Mexico.³⁶²

Equally experimental and yet rooted in the latest conceptions of physics were the canvases of Spanish artist Oscar Domínguez.³⁶³ After joining the Surrealists in 1934, Domínguez became deeply interested in exploring new modes for automatism, and he developed the decalomania process. After loading a piece of paper or a canvas with pigment, Domínguez dabbed, blotted, rotated, and blew on the surface to create the

³⁶¹ Parkinson, *Surrealism, Art, and Modern Science*, 157.

³⁶² For more on *Dyn*, see Christian Kloyber, ed., *Wolfgang Paalen's DYN: The Complete Reprint* (New York: Springer Wien, 2000). Of the articles published in the journal, astronomy crops up in book reviews of texts such as Maud Worcester Makemson's *The Morning Star, An Account of Polynesian Astronomy* (1941) and Hans Reichenbach's *From Copernicus to Einstein* (1942).

³⁶³ For more on Domínguez, see Centro Atlantico de Arte Moderno, *Oscar Domínguez: Antológica, 1926-1957* (Madrid: Tabapress, 1995); Musée Cantini. *La Part du jeu et du rêve: Oscar Domínguez et le surrealism 1906-1957*. (Marseille: Éditions Hazan, 2005); and Jean Saucet, ed., *Oscar Domínguez* (Paris: Éditions Filipacchi, 1973).

primary components of the composition. Free association allowed the painter to tap into the unconscious and find the latent imagery in such work. For Domínguez, these automatic methods allowed him to create images that were reflections of both the unconscious and recent findings in physics. In his 1942 essay “La Pétrification du Temps” [“The Petrification of Time,”] Domínguez reveals his commitment to both understanding and depicting Einstein’s concept of space-time.³⁶⁴ His friend, Spanish sculptor Apel Les Fenosa, recalled that during this period, Domínguez rambled on endlessly about physics and related scientific concepts, often pretending he was a true man of science.³⁶⁵ Moreover, as Linda Henderson contends, Domínguez’s essay also expresses an appreciation for the earlier spatial fourth dimension.³⁶⁶ In works such as his *Nostalgia of Space* (1939) [Fig. 49], Domínguez takes as his starting point the mathematical models seen at the Institut Poincaré and famously photographed by Man Ray for the 1936 Exposition Internationale de Surréalisme [Fig. 50]. However, he multiplies the confined gridded form of one of these models infinitely to express the vast reaches of the universe as imagined in the new physics.

Perhaps the greatest Surrealist contribution to visualizations of Einstein’s Theory of Relativity appears in the work of Matta. Born in Chile, the artist was first introduced

³⁶⁴ Oscar Domínguez, “The Petrification of Time,” in *Surrealists on Art*, ed. Lucy R. Lippard (Englewood Cliffs, NJ: Prentice Hall, Inc., 1970), 108-110. In his essay, Domínguez also makes mention of the popularization efforts of Arthur Eddington.

³⁶⁵ Saucet, *Oscar Domínguez*, 7.

³⁶⁶ Henderson, *The Fourth Dimension*, 501-502.

to the Surrealists in 1937 by Salvador Dali.³⁶⁷ Works from the late 1930s and early 1940s, often referred to as his “psychological morphologies,” imply a direct connection between the terrain of deep space and that of the mind. Matta also called these works his *inscapes*, again emphasizing the relationship between outer space and the inner space of the mind. According to Robert Malbert, Matta once stated that “Einstein was as important as Freud for the modern artist.”³⁶⁸

In *Psychological Morphology No. 104* (1939) [Fig. 51] Matta attempts to capture the movement of the planets and other astronomical bodies through the new landscape of space-time. His soft, modeled forms, almost as if airbrushed, melt into one another. They bend and shift, presenting multiple horizons, in an attempt to embody space-time itself, rather than simply registering its effects like Ernst had done in his oscillations. As Breton notes in a 1944 essay, Matta “invites us ceaselessly to enter a *new space* which has deliberately broken away from the old conception of space.”³⁶⁹ Much the same goal is at play in Matta’s 1944 work *The Vertigo of Eros* [Fig. 52]. While still intended as a landscape of the mind, Matta also reveals the vast open stretches of the universe with small cosmic bodies floating here and there.

³⁶⁷ For more on Matta, see Curtis L. Carter and Thomas R. Monahan, *Matta: Surrealism and Beyond* (Milwaukee: Marquette University, 1997); Elizabeth Goizueta, ed., *Matta: Making the Invisible Visible*. (Chicago: University of Chicago Press, 2004); William Rubin, *Matta: The Museum of Modern Art, New York September 10- October 20, 1957* (New York: The Museum of Modern Art, 1957); and Alain Sayag, ed., *Matta, Centre Georges Pompidou Musée national d’art modern 3 octobre -16 décembre 1985* (Paris: Éditions du Centre Pompidou, 1985).

³⁶⁸ Robert Malbert, *Matta: The Logic of Hallucination* (London: Arts Council of Great Britain, 1984), 10.

³⁶⁹ André Breton, “Matta, The pearl is marred in my eyes...,” in *Surrealism and Painting*, trans. Simon Watson Taylor (Boston: MFA Publications, 2002), 187.

As Parkinson contends, these Surrealist artists drew from direct knowledge of sources on Einstein and the latest findings in physics. Each artist found his or her own inventive approach to give form to ideas that were inherently invisible in their existence in the vast planes of interstellar space and the increasingly experimental realm of the new physics. Beyond their engagement with new contemporary conceptions of outer space, these images—especially those of Matta and Domínguez—record the landscape of deep space as visually similar to the interior spaces of the mind. For these artists, images of outer space provide a valid means to express the uncharted depths of the unconscious mind.

ANDRÉ BRETON’S SURREALIST SOURCES ON EXTRATERRESTRIAL LIFE

Beyond the science fiction films of Méliès and the literature of Surrealist precursors such as Jules Verne, Breton and the Surrealists engaged with other conceptions of extraterrestrial life. Such resources may have also helped Breton and the Surrealists posit a connection between forms of interplanetary communication and automatic writing.

In his 1939 text *Anthologie de l’humour noir* [*Anthology of Black Humor*], Breton provided a record of those literary figures whom he most admired. Among those honored, appeared the little known late nineteenth-century poet and “perpetual inventor”

Charles Cros.³⁷⁰ While Breton does not make specific mention of Cros' contributions to the later nineteenth-century extraterrestrial life debate, he most certainly would have been aware of his inventive suggestions for interplanetary communications. In 1865, Victor Meunier, science writer and scientific editor for the French newspaper *La Presse*, argued that extraterrestrial life existed on the moon and suggested a need for some mode of communication between those alien life-forms on the moon and the men of earth.³⁷¹ While Meunier never implied that anyone need pursue such communications, Cros set to work and devised a plan to beam rays of light, using parabolic mirrors, to not just the moon but also Mars and Venus. Cros posited a complex system of flashed signals and patterns that, he felt, could convey images and other information to the possible inhabitants of these planets. While Cros' ideas sound like the stuff of pure fantasy, close friend Camille Flammarion helped memorialize Cros' fantastic plan by including it in his book *Excursions dans le ciel*, first published in 1898. If Breton had not previously encountered Cros' work on interplanetary communication in the poet inventor's own writings, he may well have come across such plans in his readings of Flammarion. These later nineteenth-century ideas about communication with unknown life forms also paralleled contemporary psychical research and attempts to make contact with spirits, with which Breton was familiar.

³⁷⁰ André Breton, "Charles Cros," in *Anthology of Black Humor*, trans. Mark Polizzotti (San Francisco: City Lights Books, 1997), 119. For a brief but comprehensive biography of Cros, see Howard Sutton, "Charles Cros, the Outsider," *The French Review* 39 (February 1966): 513-520.

³⁷¹ This essay appeared in Meunier's 1865 book *Science et démocratie*. See Victor Meunier, "La Lune est-elle habitable?" in *Science et démocratie* (New York: Ballière, 1865), 97-107. See also Crowe, *The Extraterrestrial Life Debate*, 394; and Florence Raulin-Cerceau, "The pioneers of interplanetary communication: From Gauss to Tesla," *Acta Astronautica* 67 (2010): 1391-1398.

Perhaps most indicative of the possible relationship between the inner spaces of the mind and the unknown domain of outer space was Théodore Flournoy's 1899 publication *Des Indes à la planète Mars: étude sur un cas de somnambulisme avec glossolalia* [*From India to the Planet Mars: A Study of a Case of Somnambulism with Glossolalia*], which Breton owned and admired.³⁷² Flournoy, a Swiss psychologist from the University of Geneva, was instrumental in early conceptions of the unconscious.³⁷³ His research looked to contemporary practices in mediumship and argued that the information revealed during a séance or trance state was not the result of communications from the spirit world but instead a transmission from the medium's subconscious and an effect of cryptomnesia, his term for unconscious forgotten memories.

Flournoy based his conclusions on his observation of séances conducted by the medium Hélène Smith, the pseudonym he created for Catherine Elise Muller.³⁷⁴ During trance states, Smith took on multiple personalities, including an Indian princess and

³⁷² I list here two translations of Flournoy's text. Both are useful, largely because of the introductory essays contained within each. See Théodore Flournoy, *From India to the Planet Mars: A Study of a Case of Somnambulism with Glossolalia*, trans. Daniel B. Dermilyle (New Hyde Park, NY: University Books, Inc., 1963); and Théodore Flournoy, Mireille Cifali, and Sonu Shamdasani, *From India to the Planet Mars: A Study of a Case of Somnambulism with Glossolalia* (Princeton, NJ: Princeton University Press, 1994). Breton owned a 1900 edition of this text as well as Flournoy's 1911 publication *Esprits et Médiums: Mélanges de métaphysique et de psychologie*. See André Breton: 42, rue Fontaine, Volume 2: Livres II, 209. See also Théodore Flournoy, *Spiritism and Psychology*, trans. Hereward Carrington (New York: Harper and Brothers, 1911).

³⁷³ For more on Flournoy's biography, see Édouard Claparède, "Théodore Flournoy. Sa vie et son oeuvre," *Archives de psychologie* 18 (1923): 1-125; Robert Earl Goldsmith, "The Life and Work of Théodore Flournoy, 1854-1920" (PhD diss., Michigan State University, 1979); and James S. Wittzig, "Théodore Flournoy—A Friend Indeed," *Journal of Analytical Psychology* 27 (April 1982): 131-148.

³⁷⁴ For a discussion of Flournoy's relationship with Smith and his writings about her trance states, see the introductory essay by C. T. K. Chari in the 1963 English translation of Flournoy's text. See also Ellenberger, *The Discovery of the Unconscious*, 315-318; and Lachapelle, *Investigating the Supernatural*, 59-85.

Marie Antoinette. While Flournoy found these characters fascinating, he was most intrigued by Smith's communication with the inhabitants of Mars. Beginning in late 1894, Smith claimed to be transported to the planet and described and painted the environment and society of Mars. By 1896 Smith also began to speak and write in a language that she asserted was the Martian dialect.³⁷⁵ Flournoy used this condition of glossolalia, or speaking and writing in tongues, as a means to substantiate his theories on the unconscious. Flournoy argued that he recognized structural similarities between Smith's Martian language and French. As a result, he asserted that this supposed Martian tongue was the product of subconscious invention and fantasy. Moreover, Flournoy also contended that Smith's ideas on Mars came at a time when the red planet was a part of the popular imagination. The planet appeared frequently not only in science fiction but also in contemporary astronomical debates over the Martian canals.³⁷⁶ For Flournoy, this was not simple coincidence but evidence of Smith's unconscious desire to entertain her audience.

In 1933, Breton made mention of Flournoy's work in "La Message automatique" ["The Automatic Message"]. First printed in *Minotaure*, Breton complemented his essay

³⁷⁵ For a brief but useful evaluation of Smith's Martian language, see Daniel Rosenberg, "Speaking Martian," *Cabinet* 1 (Winter 2000-2001) accessed June 1, 2010, http://www.cabinetmagazine.org/issues/1/i_martian.php.

³⁷⁶ Flournoy, *From India to the Planet Mars*, 140-142. Flournoy makes specific mention of the recent popularity of Camille Flammarion's *La Planète Mars et ses conditions d'habitabilité, synthèse générale de toutes les observations* [*The Planet Mars and its Conditions of Habitability, A General Synthesis of All the Observations*]. In this text Flammarion provides a history of astronomical study and observations of Mars beginning in the mid-seventeenth century up to the most recent events of the Martian canal debates. He supplements his text with some 580 drawings, including his own observations of the planet's surface. See Camille Flammarion, *La Planète Mars et ses conditions d'habitabilité, synthèse générale de toutes les observations* (Paris: Gauthier-Villars et Fils, 1892).

with reproductions of some of Smith's drawings, including one of her Martian landscapes. Breton likely first became familiar with Smith's paintings and drawings through the 1932 exhibition catalog of her work organized by art historian Waldemar Deonna.³⁷⁷ Despite his awareness of such images and their inclusion in Surrealist publications, Breton was most interested in Smith's use of language and mediumship as an early example of automatic writing practice.³⁷⁸ Beyond these specific relationships to Surrealist practice, however, the idea of an alien language and the possibility of contact with an as yet unseen world or planet are also eerily similar to larger Surrealist efforts to make contact with the unconscious.

SURREAL VISIONS OF INTERSTELLAR SPACE AND TRAVEL

As discussed earlier in this Chapter, artists Oscar Domínguez, Wolfgang Paalen, and Matta, all expressed interests in Einstein's Theory of Relativity and shifting conceptions of the universe seen in the new physics. However, paintings produced contemporaneously also evoke more fantastic versions of outer space and depict space travel and extraterrestrial life. Given Breton's possible comparison of extraterrestrial communication and automatic methods to access the unconscious, these images invoke

³⁷⁷ Breton owned a copy of this catalog at the time of his death. See *André Breton: 42, rue Fontaine*, Volume 2: Livres II, 207. Deonna's exhibition opened in November 1929, shortly after Smith's death in June of that year, and was held at the Musée d'Art et d'Histoire in Geneva. See Waldemar Deonna, *De La Planète mars en terre sainte, arte et subconscient un médium peintre: Hélène Smith* (Paris: De Boccard, 1932). For additional analysis of Smith's art, see Allison Morehead, "Symbolism, Mediumship, and the 'Study of the Soul that has Constituted Itself as a Positivist Science'," *RACAR* 34 (2009): 77-85.

³⁷⁸ He later celebrated Smith's relevance to the Surrealist project by including her within the Surrealist Tarot deck, the Jeu de Marseilles, which will be discussed in Chapter Five. Smith represented the Siren in the deck's suit of locks.

not only a preoccupation with astronomical themes and imagery, but also a possible further means to symbolically represent the unconscious.

In his 1938 painting *Space Travel* [Fig. 53], Matta provides an image of some unknown force or vehicle swiftly moving through deep space. Color and line almost zoom between two rounded planetary bodies or stars. These speeding forces connect these two astronomical bodies, perhaps suggesting a means of contact between these two alien worlds.

Paalen provides his own vision of space travel in a 1937 painting simply entitled *The Space-ship* [Fig. 54]. The work depicts a strange landscape populated by the shattered and twisting geometric forms seen in other works from this same period. In a dark, empty sky, a glowing, amoeba-like form floats. This is Paalen's space ship. Perhaps more a biological entity than some machine for transport, the ship hovers over the alien forms below.

Yet another representation of space travel may appear in Domínguez's 1939 painting *Les Soucoupes volantes* [*Flying Saucers*] [Fig. 55]. It is unclear if this title was original or a later addition. However, the term "flying saucer" only gained meaning in connection with extraterrestrial phenomena after 1947 when the media popularized the purported claims of an American pilot who claimed to have seen saucer-like objects while flying near Mount Rainier.³⁷⁹ The artist depicts small round forms similar to a child's top. They appear to be both spinning rapidly and frozen within the cosmic

³⁷⁹ Dick, *The Biological Universe*, 271-273.

landscape. A vast, swirling ground of blacks, grays and whites evokes the vast terrains of interstellar space.

Despite Domínguez's highly scientific interests in Einstein and the new physics, his work from the late 1930s and beyond reveals a more fantastic vision of space drawn from the popular and scientific musings on the possibility of life outside our planet. And, given the possible appearance of space craft in his work, other Cosmic themed paintings seem also to suggest other imaginative views of outer space. An untitled work from 1939, sometimes referred to as *Paysage cosmique* [*Cosmic Landscape*] [Fig. 56], provides a rainbow-hued, almost kaleidoscopic vision of the view of space from the surface of some extraterrestrial world. The craggy, mountainous topography suggests science fiction imaginings of the lunar surface like those seen in Méliès' *From the Earth to the Moon*. The view of several round planetary bodies on the horizon further suggests that this is not a terrestrial viewpoint. In a much later work from 1954, simply entitled *Mars* [Fig. 57], Domínguez provides yet another view of the heavens, this time as seen from the surface of the red planet. Using the decalomania technique, the artist uses the textural patterns of the manipulated pigment to represent the rugged, red-brown terrain of this strange planet. A flat blue ground suggests the vast unknown of space and odd projectiles fall through the planet's atmosphere and appear to pelt the Martian topography.

In all of these works, these artists use the vast spaces of interstellar space as a realm for new inventive subjects appropriate to Surrealism. Much like more scientific

depictions of Einstein's space-time continuum, these musings on outer space reveal that much like the occluded space of the unconscious, deep space is a realm of the unknown. As such, its previously unseen terrains, strange vehicles, and vast unknown spaces became an apt space for Surrealist creation.

Chapter 5

Astral Magicians: Surrealism and Occult Astronomy

In his 1930 Second Manifesto of Surrealism André Breton wrote, “I ask for the profound, the veritable occultation of Surrealism.”³⁸⁰ In these few words, Breton urged his compatriots to look to the occult, in all its manifestations, as a source for Surrealist creative endeavors. While the Surrealists had certainly expressed interest in occultism during the 1920s, their borrowings from occult iconography steadily increased during the 1930s and 1940s.

Breton’s interest in astronomical subjects can be further authenticated with his research into astrology and the Tarot. His exploration of astrology exposed him to an ancient practice that contemporary occultists continued to redefine. His engagement with the cosmos was also inherently linked to his engagement with the Tarot. While some cards express a direct relation to the cosmos via their inclusion of astronomical imagery, the occult literature he read also stressed the deck’s symbolic ties to heavenly bodies and meaning.

In his 1948 publication *The Mirror of Magic*, second- generation Surrealist Kurt Seligmann provided his Surrealist compatriots with a rich resource on astrology, the tarot, and other occult concerns. In the late 1930s and 1940s, Seligmann devoted himself to esoteric research, and his peers identified him as an occult adept and routinely sought out

³⁸⁰ André Breton, *Manifestoes of Surrealism*, 178.

information from him on a full range of hermetic topics. His text provides a record not only of how the Surrealists may have understood specific occult sciences but also the sources they may have encountered in their engagement with such topics.

Among those second- generation artists that addressed occult subjects in their creative production, Remedios Varo and Leonora Carrington referenced astrology and the Tarot in their art. These occult practices offered yet another means to engage with the Surrealist interest in astronomy. In such work, Varo and Carrington combine a keen understanding of specific astrological symbolism and Tarot iconography with their own fantastic imagery to create paintings that reflect the greater Surrealist pursuit of the marvelous.

BRETON AND ASTROLOGY

Breton did not allow for many interviews over the course of his lifetime, but one of the twenty or so interviews he granted was with the journal *L'Astrologue* in 1968.³⁸¹ While his answers seem controlled, if not prepared, Breton speaks passionately about astrology. This passion, coupled with the fact that he chose to give one of the few

³⁸¹ The interview originally appeared in *L'Astrologue* 4 (1968): 4-6. The original interview took place in April 1954 in conversation with astrologers Jean Cateret and Roger Knare. Nicolas Campion's article on Breton and astrology includes Morelle Smith's translation of this interview. See Nicolas Campion, "Surrealist Cosmology: André Breton and Astrology," *Culture and Cosmos* 6 (Autumn/Winter 2002): 45-56. *L'astrologue* continues to be printed and remains the chief vehicle for astrological concerns in France. André Barbault, the journal's founder, was likely an acquaintance of Breton, who owned a signed copy of his 1955 text *Défense et illustration de l'astrologie*. See *André Breton: 42, rue Fontaine*, Volume 2: Livres II, 205.

interviews during his life to a group of astrologers, reveals his dedication—at least at this moment late in his career—to astrology.

In a 1954 letter addressed to the Centre International d’Astrologie, Breton revealed further details about his introduction to the practice and how he viewed the discipline.³⁸² He records that he was first introduced to astrology in 1927 by Valentine Penrose.³⁸³ In addition to Penrose, Breton also notes that he benefitted from colleague Pierre Mabillet’s knowledge of the subject. Mabillet joined Surrealism in 1934. He was well known for his study of occult phenomena and publications, such as his 1940 text *Le Miróir du merveilleux* [*Mirror of the Marvelous*], which provided a comparative study of occult and religious literatures.³⁸⁴ Demonstrating his knowledge of astrology, Mabillet

³⁸² A scan of this letter can be found online at the Association Atelier André Breton website. This online wiki was first founded, with the blessing of Breton’s daughter Aube, just prior to the 2003 auction at Camels Cohen and preserves scans of a large portion of the personal manuscripts and other effects later auctioned. See André Breton. “Réponse à l’enquête du Centre international d’astrologie.” Association Atelier André Breton, accessed June 20, 2010, <http://www.andrebretton.fr/fr/item/?GCOI=56600100384700>.

³⁸³ Aside from the surname “Penrose,” Valentine is also sometimes referred to by her maiden name, Boué, in Surrealist scholarship. A French poet associated with Surrealism in the early 1920s, she married British artist and poet Roland Penrose in 1922. Penrose’s son Antony—from his later marriage to Lee Miller—recalls that Valentine “had a natural air of mysticism” and dabbled in a number of occult practices. See Antony Penrose, *The Home of the Surrealists: Lee Miller, Roland Penrose, and their circle at Farley Farm* (London: Frances Lincoln Limited Publishers, 2001), 16. Penrose never mentions astrology, but does remark that Valentine “[used] Tarot cards to foretell the future with disturbing accuracy.” For more on Valentine’s life and literature, see Renée Riese Hubert, “Gender, Genre, and Partnership: A Study of Valentine Penrose,” in *The Other Perspective of Gender and Culture: Rewriting Women and the Symbolic*, Ed. Juliet Flower-MacCannell (New York: Columbia University Press, 1990), 117-142.

³⁸⁴ Previously trained as a surgeon, Mabillet took courses at the Sorbonne in ancient Sumerian, world cosmologies, and esotericism starting in the early 1930s. He was also well connected to contemporary scholars on the occult, including French occultist Pierre Piobb. The pseudonym of Peter Vicenti, Piobb published extensively on occult sects such as Rosicrucianism and Martinism and also translated key texts by other occult luminaries such as the alchemist Robert Fludd. For more on Mabillet, see Remy Laville, *Pierre Mabillet: un compagnon du surréalisme*. (Clermont-Ferrand, France: Association des publications de la faculté des lettres et sciences humaines de Clermont-Ferrand, 1983).

published an astrological chart, with analysis, for Isidore Ducasse (Comte de Lautréamont) in a 1937 issue of the Surrealist journal *Minotaure*.³⁸⁵ Given such skill, Mabilille may have aided Breton with his later study of birth charts.

Although they are undated, a series of astrological charts, reproduced in the catalog for the Camels Cohen auction of Breton's possessions, reveal that Breton also knew how to produce birth charts. His charts are meticulous, sometimes accompanied by multiple pages of attached notes on various conjunctions and other points of interest. We have a record of nineteen charts completed by the author.³⁸⁶ Dating from the late 1920s and 1930s, Breton analyzed the birth charts of the following individuals: Louis Aragon, Charles Baudelaire, René Char, René Crevel, Robert Desnos, J. K. Huysmans, Alfred Jarry, Isidore Ducasse (Comte de Lautréamont), Benjamin Péret, Antoine de Saint-Exupéry, Arthur Rimbaud, Max Ernst, Nusch Eluard, Pablo Picasso, Paul Eluard, Soupault, Valentine Hugo, Victor Hugo, and Yves Tanguy. The charts for nineteenth-century authors and other luminaries may have been a way for Breton to practice his skills at prediction. Certainly, a chart for a prominent literary figure like Baudelaire would have been something Breton could have accessed already complete. However, the charts for his contemporaries and friends in the Surrealist movement reveal that Breton was producing these for more than just practice. Instead, they expose an intimate shared

³⁸⁵ Pierre Mabilille, "Le Ciel de Lautréamont," *Minotaure* 12-13 (1937): 84-85.

³⁸⁶ *André Breton: 42, rue Fontaine*, Volume 3: Manuscripts, 103-12; and "Astrologie." Association Atelier André Breton, accessed June 20, 2010, <http://www.andrebretton.fr/fr/recherche/?fa=tags&tag=astrologie>.

moment between Breton and a friend, in which he likely met with the person and shared the chart as well as his astrological knowledge.

References to astrology also appear in Breton's essays and other writings. In his 1930 Second Manifesto of Surrealism, in which he called for the "occultation" of Surrealism, Breton included a lengthy explanatory footnote. By "occultation" he lays claim to "those sciences which for various reasons are today totally discredited" and then as a clarification names both astrology and metaphysics as examples.³⁸⁷ He goes on to make a comparison between these occult methodologies and the Surrealist project. Breton describes Surrealist parlor games, such as Exquisite corpse, as an act of "forecasting events which would bring about some completely unexpected situation."³⁸⁸ As such, he sees the predictive component of astrology as not unlike Surrealist automatism. A few pages later in yet another lengthy footnote, Breton again engages his newly found astrological knowledge, this time focusing on issues of planetary influence and conjunctions. Breton suggests a similarity between Surrealism and "Uranian influence."³⁸⁹ In astrological charts, Uranus is frequently associated with independence and sudden changes. The planet is also associated with magicians, occultists, innovators,

³⁸⁷ Breton, *Manifestoes of Surrealism*, 178.

³⁸⁸ Breton, *Manifestoes of Surrealism*, 179.

³⁸⁹ Breton, *Manifestoes of Surrealism*, 182.

and reformers.³⁹⁰ Such associations suggest comparison to Surrealism, which Breton had envisioned as an artistic and literary force of liberation, a voice for change and freedom.

In yet another passage from the Second Manifesto, Breton turned his attention to planetary conjunctions with Uranus.³⁹¹ Breton highlighted the conjunction of Uranus and Saturn at the time of his, Eluard, and Aragon's birth. As explanation for the astrological significance of this conjunction, Breton refers to "Choisnard" by which he means Paul Choisnard (1866-1930).³⁹² Choisnard was a key figure in the astrological revival in France during the late nineteenth and early twentieth century. He was perhaps best known for statistical research regarding planetary influence, especially on the lives of individuals. In his essay, Breton focuses on Choisnard's prediction that an individual born under this planetary event will be both sage and independent, a "first class investigator."³⁹³ In addition, he highlights Choisnard's prediction that those born under the sign may "give birth to a new school."³⁹⁴ Thus, Breton uses his own astrological chart as a means to justify his role in the Surrealist project.

³⁹⁰ Louis MacNeice, *Astrology* (Garden City, NY: Doubleday, 1964), 291.

³⁹¹ A conjunction refers, quite literally, to moments when two celestial bodies appear close to one another in the sky. Because astrology relies upon the position of heavenly bodies, special meaning is usually given to such an occurrence.

³⁹² Choisnard also published under the name "Paul Flamberg." Breton refers specifically to Choisnard's 1893 publication *L'Influence astrale*.

³⁹³ Breton, *Manifestoes of Surrealism*, 182.

³⁹⁴ Breton, *Manifestoes of Surrealism*, 182.

In his later essay, “Ascendant Sign,” Breton again refers to astrology.³⁹⁵ This time, however, he makes a comparison between astrology and poetic analogy rather than specifically speaking to Surrealism. He sees a relationship between the similarities manifested in literary analogy and the system of correspondences that are instrumental to the work and predictive skill of the astrologer. He writes, “There is an age-old conviction that nothing exists gratuitously, that quite to the contrary there is not a single being or natural phenomenon that does not carry a message to be deciphered by us.”³⁹⁶ Thus, for Breton, poetic symbolism could be explained using the terminology of astrology. Moreover, the title of the article pushes readers to consider whether the types of hidden messages and predictions that man has traditionally found in the heavens might also occur in poetry. In the practice of astrological divination, Breton saw a metaphor for his work as a poet and a Surrealist.

BRETON AND THE TAROT: THE JEU DE MARSEILLES, *ARCANE 17*, AND *LE SURREALISME EN 1947*

Breton’s engagement with and understanding of the Tarot can be traced through several projects he completed during and just after World War II. As addressed in Chapter One, books that Breton owned on the Tarot and astrology—including works by Eliphas Lévi, Papus, and Oswald Wirth—linked the two practices and highlighted the

³⁹⁵ André Breton, “Ascendant Sign,” in *Free Rein*, trans. Michel Parmentier and Jacqueline d’Amboise. (Lincoln, NE: University of Nebraska Press, 1995), 104-107.

³⁹⁶ Breton, “Ascendant Sign,” 104.

astrological and astronomical significance of the Tarot deck. Thus, for Breton, there was a strong connection between his preexisting interests in astrology and his later research on the Tarot.³⁹⁷

In late 1940, based on his contemporaneous research on the Marseilles Tarot deck, Breton conceptualized and oversaw the production of the *Jeu de Marseilles* in collaboration with other Surrealist artists then living in Marseilles. Breton's novel *Arcane 17*, written in 1944, allowed the author to further explore the deck's inherent symbolic content. The text takes as its subject the Tarot deck's seventeenth Arcanum, The Star, a card with obvious ties to astronomy. Finally, in 1947 Breton joined forces with Marcel Duchamp to curate the first exhibition of Surrealism held in Paris since before the war. Organizing the exhibition around the theme of occult initiation, Breton incorporated his knowledge of the Tarot into his designs. While it is unclear how Breton first became interested in the Tarot, he found within the deck a flexible mode for symbolic expression similar to other Surrealist imagery.

The Surrealist Tarot: The Jeu de Marseilles

As a group, the Surrealists first revealed their interests in the Tarot with the production of the *Jeu de Marseilles*. Breton, Victor Brauner, Varo, Ernst, Domínguez, Masson, Jacqueline Lamba, Wifredo Lam, and Jacques Hérold all came together in late 1940 to design and illustrate the cards. Although the resulting deck simply reworks the

³⁹⁷ Other Surrealist artists, including Varo, Carrington, and Victor Brauner, reference imagery from the Tarot in their paintings. However, work by these artists does not show a strong link to astronomical understandings of the Tarot deck.

standard fifty-two card deck, it is imbued with the spirit of the Tarot due to its wealth of imagery and Surreal associations.

Following the Nazi invasion of Paris in June 1940, many Surrealists flocked to the port city of Marseilles in hopes of obtaining visas to allow their escape to the United States and other locations abroad. Breton found safe haven at Villa Air-Bel, a home in the suburbs of Marseilles maintained by Varian Fry and the Emergency Rescue Committee.³⁹⁸ Perhaps in an effort to evoke some sense of normalcy, Breton and his Surrealist compatriots gathered almost nightly to play games, arrange collaborative art projects, and stage auctions to help fellow artists raise necessary funds. In addition to these activities, Breton spent time at Marseilles' Bibliothèque de la place Carli.³⁹⁹ While there he consulted historical sources on the Marseilles Tarot, which he would use as the basis for a Surrealist Tarot deck. Breton intended that these cards would replace traditional card decks. As he saw it, "[the deck] must not only be an incitement to new

³⁹⁸ Between August 1940 and September 1941, the American-born journalist Fry and the ERC helped more than 2000 people escape France. His efforts were made possible with the help and support of Americans such as Eleanor Roosevelt and other important cultural figures, art dealers, and patrons in the United States. These individuals wrote letters on behalf of the artists and others helped by the ERC, paid for passage from Europe, and petitioned government offices for the necessary documents. For an account of the activities of the Emergency Rescue Committee, Varian Fry's time with the Surrealists, and the daily activities at Villa Air-Bel, see Horace Brockington, "Creative Occupation: Collaborative Artistic Practices in Europe 1937-1943," in *Artistic Bedfellows: Histories, Theories and Conversations in Collaborative Art Practices*, ed. Holly Crawford (New York: University Press of America, Inc., 2008), 27-59; Varian Fry, *Surrender on Demand* (Boulder, CO: Johnson Books, 1997); and Andy Marino, *A Quiet American: The Secret War of Varian Fry* (New York: St. Martin's Press, 1999).

³⁹⁹ Musées de Marseille, *Le Jeu de Marseille*, 71-75.

games, the rules of which should be evolved *from* it instead of being defined beforehand, but also be suitable for all the traditional games.”⁴⁰⁰

The resulting deck did not truly replicate a Tarot deck [Fig. 58]. The Surrealists only produced four cards for each suit. They substituted new symbols for the traditional suits.⁴⁰¹ The black stars and locks represented dreams and knowledge respectively, while the red flames and wheels symbolized love and revolution.⁴⁰² The Surrealist deck also dismissed previous hierarchies in the face cards, replacing the King, Queen, and Jack with Genius, Siren, and Sage. For each suit, these face cards were populated with portraits of famous historical and fictional figures important to the Surrealists.⁴⁰³ Thus, the images of the Jeu de Marseilles, like those of the Tarot’s major arcana, suggest deeper meaning and symbolism and require interpretation.

Breton and his fellow collaborators also imbued their card deck with the spirit of the Tarot by creating a deck that bears a striking resemblance to the Tarot of Marseilles. In the Jeu de Marseilles, each card shows a tendency toward figural outline and a use of

⁴⁰⁰ André Breton, “The Marseilles Deck,” in *Free Rein*, trans. Michel Parmentier and Jacqueline D’Amboise (Lincoln: University of Nebraska Press, 1995), 48-50.

⁴⁰¹ The Jeu de Marseilles substituted stars, locks, flames, and wheels for the clubs, spades, hearts, and diamonds in traditional playing cards or the wands, swords, cups, and coins in the Tarot of Marseilles.

⁴⁰² Breton hoped to erase any link between his deck and the military derivation of the traditional suit signs. See Sawin, *Surrealism in Exile*, 130; and Breton, “The Marseilles Deck,” 49.

⁴⁰³ The red suit of flames included Baudelaire, the Portuguese Nun, and Novalis as the Genius, Siren and Sage respectively. The Portuguese nun refers to the seventeenth-century romantic author of *Les Lettres Portugaises* from 1669. See Mahon, 72. For the black suit of stars, the group chose to represent Lautréamont, Lewis Carroll’s Alice, and Freud. The cards for the red wheel depicted Sade, Lamiel, and Pancho Villa. Finally, the black locks consisted of Hegel, Hélène Smith, and Paracelsus. A list of these new suit signs and their designations is provided in Breton’s essay on the deck. See Breton, “The Marseilles Deck,” 50.

flattened perspective. Additionally, the deck exhibits a palette of the primary hues, along with a few additions of black and white. Similarly, illustrations in the Marseilles deck only use the primary colors along with spare additions of green, brown, white and black. The figures are simply rendered, with strong outlines, minimal attempts at value, and shallow space.

The Jeu de Marseilles is a unique contribution not only to the Surrealist oeuvre, but also to the history of the Tarot. During the twentieth century, more and more Tarot decks would be developed with new interpretations of traditional decks. While some of these simply riffed on traditional illustrations, others invented new iconography all together and associated a range of ideologies and imagery with the cards.⁴⁰⁴ The Jeu de Marseilles represents one more entry in this tradition of reconsidering and re-illustrating the Tarot. Moreover, the deck reveals Breton and his compatriots' research into the Tarot and their knowledge of long-used decks such as the Marseilles Tarot.

Arcane 17

Breton's publication of *Arcane 17* in 1944 marks yet another attempt by the artist to link Surrealist literary practice with the occult.⁴⁰⁵ Of all Breton's borrowings from the

⁴⁰⁴ For an analysis of types of Tarot imagery as well as some acknowledgement of how the Surrealists fit within this shift, see Emily E. Auger, *Tarot and Other Meditation Decks: History, Theory, Aesthetics, Typology* (Jefferson, NC: McFarland and Company, Inc., 2004). Also, it is important to note that Surrealist artist Salvador Dalí created Tarot imagery over the course of his life. These images were compiled and released as the Dalí Universal Tarot (reissued by US Games in 2004). See Johannes Fiebig, Salvador Dalí, and Manfred Miethe, *The Salvador Dalí Tarot* (Krummvisch, Kiel: Königsfurt Verlag, 2004).

⁴⁰⁵ André Breton, *Arcanum 17 with Apertures: Grafted to the End*, Trans. Zack Rogow (Los Angeles: Sun & Moon Press, 1994).

Tarot, this text also shows the greatest link to astronomical concerns. Written over the course of three months during a summer getaway to Quebec's Gaspé Peninsula, the novel is a tale of loss, love, and renewal after having suffered through personal heartbreak and the unsettling events of World War II.⁴⁰⁶ As a response to such tragedies, *Arcane 17* insists that "all the power for the regeneration of the world lies in human love."⁴⁰⁷

Breton draws his title for his text from the seventeenth Arcanum of the Tarot, the Star [Figs. 59 and 60]. In the Marseilles deck, the card depicts a woman, kneeling at a stream with two vessels. Seven small stars and one large stellar body shine in the sky above her. In most systems of Tarot divination, this card symbolizes renewal and resurrection⁴⁰⁸ In the sequence of the major arcana, the Star directly follows the Devil (Arcanum 15) and the Tower (Arcanum 16). These two preceding cards refer to catastrophe, loss of faith, and general devastation. Such associations make a fitting comparison not only to the recent dissolution of Breton's marriage, but also to the greater circumstances he faced during World War II. By turning over the next card, the Star, Breton here looks forward, hopeful that both he and the world will soon find change, love, and peace.

⁴⁰⁶ Breton had gone to Quebec with Elisa, the woman that would become his third wife. After his arrival in New York in 1941, Breton's previous wife, Jacqueline had an affair with David Hare, the editor of the American Surrealist periodical *VVV*.

⁴⁰⁷ Breton, *Arcanum 17*, 55.

⁴⁰⁸ Place, *The Tarot: History, Symbolism, and Divination*, 208.

Such interpretations of the Star card rely upon the astrological symbolism inherent in the card's imagery and associated correspondences. The large, bright star, depicted just over the woman's head, is often identified as the Morning Star or the planet Venus. This astronomical body, according to astrological interpretations, heralded love and wisdom, which Breton so desired in light of recent events.⁴⁰⁹

A recent transcription of Breton's original manuscript, compiled by Henri Béhar, serves to further confirm Breton's astrological understanding of the Tarot deck.⁴¹⁰ Among the ephemera and clippings compiled in the text, there appear two versions of the Star card, one from the Tarot of Marseilles, which Breton had spent time studying prior to his departure for the United States, and the other from Oswald Wirth's Tarot deck. As addressed in Chapter One, Wirth advocated for a system of occult correspondence between the twenty-two major Arcana and major constellations. His writings on the so-called "Astronomical Tarot" stressed the importance of astrological training for reading and understanding the deck. Wirth's planisphere associates the Star with *Pisces*.⁴¹¹ As the twelfth sign, Pisces represents the completion of the zodiac cycle, but it also indicates that this same cycle will soon begin again. Much like the love and wisdom signified by the Morning Star, the card, through its associations with Pisces, also designates renewal or a new start.

⁴⁰⁹ Papus refers to Venus as a "harbinger" for love and wisdom that portends future transformation. See Papus, *Astrology for Initiates*, 41-40.

⁴¹⁰ André Breton, *Arcane 17: Le manuscrit original Édition prepare et présentée par Henri Béhar*, ed. Henri Béhar (Paris: Biro éditeur, 2008).

⁴¹¹ Papus, *Tarot of the Bohemians*, 250.

Wirth's description of The Star from his *Tarot des imagiers du moyen âge* is also especially intriguing when read with an eye toward extracts that express shared ideologies with Surrealism. He states,

The mysteries of arcana 17 are those of sleep and night. When we sleep our spiritual soul escapes from the resting body, now left to the simply automatic functioning of its organs. In the course of the night what are the occupations of the liberated self? Do we not live, in two parts, as flesh thus periodically set from the bonds of the flesh? Is there a more vital need than that of sleep? We cannot live without sleeping. We divide ourselves into two existences, of which one is unknown to us. Every morning we return from a journey and we know nothing of its adventures except at most what we learn in the form of dreams; these happen when our brain registers images, witnesses of our unconscious nightly activity....Sleep is therefore a source of information which must not be neglected. Through it the curtain of mystery is drawn aside, to allow us a few furtive glimpses giving shape to the too vague presentiments which make us guess at another world. Dreams have been the first initiators of humanity.⁴¹²

In this passage, Wirth comes close to defining the unconscious and addresses the way in which dreams provide access to this hidden realm. Such an excerpt would not be out of place in one of Breton's essays on Surrealism and their similar reliance on dreams. If then, The Star represents "night" and the realm of the "liberated self," Breton's choice of this card from the Tarot as the subject and title of his novel takes on far greater meaning. Beyond its more simplistic symbolism of metamorphosis and healing, Breton saw in The Star a symbol for the very practices of Surrealism and a creative means to symbolically reference the primacy of the unconscious.

⁴¹² Wirth, *The Tarot of the Magicians*, 135.

The 1947 Surrealist Exhibition and the Tarot

Following Breton's return to Paris in May 1946, he set his sights on a new exhibition that would reunite the Surrealists after the events of World War II. He also hoped to reinforce Surrealism's continued existence as the dominant avant-garde movement in Paris, despite the recent prominence of the Existentialists and founder Jean Paul Sartre's dismissal of the Surrealists.⁴¹³ With the help of Duchamp, Breton organized a showing of more than 100 artists and contributors at the Maeght Gallery.⁴¹⁴ *Le Surréalisme en 1947* marked the first international exhibition of Surrealist work in Paris since World War II.

In the wake of the war, this show served as a means to demonstrate a united front for the Surrealists, and Breton and Duchamp hoped to stress this unity in two ways. First, they invited a wide range of artists, including those currently involved as well as past members. More importantly, however, Duchamp and Breton organized the exhibition around a central theme of myth and the occult. They hoped to create what Breton termed a "spiritual parade" that reflected the continued concerns and practices of Surrealism.⁴¹⁵

⁴¹³ Sawin, *Surrealism in Exile*, 391. For more on the tensions between Breton and Sartre, see Sawin *Surrealism in Exile*, 389-394; and Durozoi, 463-466.

⁴¹⁴ André Breton and Marcel Duchamp, *Le Surréalisme en 1947: Exposition internationale du surréalisme* (Paris: Maeght, 1947). The catalogue lists 85 participants; however, Sawin records that more were added to the show after the catalogue had gone to press. See Sawin, *Surrealism in Exile*, 395. While Duchamp contributed a great deal to the ideas and organization of the exhibition, it is important to note that he was still in New York and his collaboration with Breton occurred via correspondence.

⁴¹⁵ André Breton, "Before the Curtain (preface to the 1947 exhibition catalogue)" in *What is Surrealism? Selected Writings*. Ed. Franklin Rosemont (New York: Pathfinder, 1978) 367.

Myth and the occult, for Breton at least, would serve as a necessary agent of healing and a stepping stone toward Surrealism's future in the post war world.

Many of Breton's plans for the exhibition can be found in "Projet Initial," an excerpt from a letter inviting artists to participate in the exhibition.⁴¹⁶ Breton describes his desire to create a space of "initiation" that shows the development of Surrealism, from its earliest precursors (Bosch, Blake, Carroll, etc.) to those contemporary artists who have gradually "gravitated into the [Surrealist] orbit."⁴¹⁷ The letter also outlines the basic layout for the gallery space, including the Hall of Superstitions (a strange irregular grotto to be designed by Friedrich Kiesler); a second, octagonal room with a billiard table (one entered through a curtain of rain in keeping with the theme of renewal and initiation); and, finally, a labyrinthine space filled with ritualistic altars.⁴¹⁸

This layout certainly helped create a gallery space that reflected this theme of initiation. But, Breton also used symbolism and ideas drawn from the Tarot as a means to further emphasize this theme of occult initiation. Breton assigned one of the tarot trumps—in ascending order—to each of the 21 steps leading into the gallery, beginning with Arcanum 1, Le Bateleur or the Magician, and ending with Arcanum 21, Le Monde

⁴¹⁶ André Breton. "Projet Initial." In *Le Surréalisme en 1947*. Ed. André Breton and Marcel Duchamp. (Paris: Éditions Pierre à Feu, 1947) 135-138.

⁴¹⁷ Breton, "Projet Initial," 135.

⁴¹⁸ Breton, "Projet Initial," 136. See also Sawin, *Surrealism in Exile*, 395 and Mahon, *Surrealism and the Politics of Eros*, 118-132.

or the World.⁴¹⁹ He omitted the Fool. Each trump was then assigned a text that was later painted along the rise of each step to resemble the spine of a book.

Breton matches texts—most by Surrealist literary precursors—to each major Arcanum, matching the spirit of the author or his particular publication to accepted attributions and interpretations of each card. For example, for Arcanum 5, the Pope, Breton assigns Charles Baudelaire's *Les Fleurs de Mal*.⁴²⁰ The Pope is often seen as a spiritual teacher who provides guidance, love, or protection; he is also associated with the idea of tradition.⁴²¹ For the Surrealists—and more importantly for Breton—Baudelaire and his writings marked a true break from previous literary tradition and the beginning of a new tradition of which their work was a part.⁴²² Baudelaire's *Les Fleurs de Mal* was not simply a text that shattered previous literary tradition; it gave birth to a new tradition, a tradition of which Surrealism strove to be a part. Baudelaire, in the mind of Breton at least, was a literary Pope, who ushered in a new era of poetic practice.

For Arcanum 15, the Devil, Breton assigned Alfred Jarry's play *Ubu Roi*. The Devil is a card most associated with transgressive individuals who may lose control of

⁴¹⁹ Breton, "Projet Initial," 136. Breton seems unwilling to deal with the numbering issues that are inherent with the fool. In many decks, including the Tarot of Marseilles, the fool is labeled as zero. In these deck, the fool still serves as a trump, and there are still 22 major arcana cards. In other decks, the fool is numbered as 22. This is especially true of decks and designers that stress the link between the cards and the Kabbalah, labeling each card with one of the 22 letters of the Hebrew alphabet.

⁴²⁰ Breton, "Projet Initial," 136.

⁴²¹ Paul Marteau, *Le Tarot de Marseille* (Paris: Arts et Métiers Graphiques, 1949), 25-27. Breton also owned a copy of Marteau's text on the Marseilles deck. See *André Breton: 42, rue Fontaine*. Volume 2: Livres II, 224.

⁴²² Balakian, *Literary Origins of Surrealism*, 45.

themselves or their actions, running amok and uncontained.⁴²³ These associations hold true not only for Jarry's Ubu and the riotous behavior the character inspired at the play's first performance but also Jarry's own absurd actions.⁴²⁴ In his *Anthology of Black Humor*, Breton celebrates Jarry's spirit.⁴²⁵ He relates—from a story told by Apollinaire—Jarry's wild behavior as he once brandished a gun in public, threatening the lives of passerby and children as he shot wildly without an intended target. While Jarry's behavior in this instance reveals his tendency toward uncontrolled behavior, Breton celebrated his crazed approach to life. Jarry lived free of all restrictions and constantly pushed the boundaries in both his life and his art. Thus, the Devil made an excellent card to associate with not only the author, but also with Ubu, the king of absurdity.

Breton's use of the Tarot cards along the stairway also served to emphasize the theme of an occult initiation. The Tarot is often seen as the Fool's journey, a quest or mythic rite for some higher philosophical understanding or esoteric knowledge.⁴²⁶ With their location near the end of this progression, cards such as the Star, the Moon (Arcanum 18), and the Sun (Arcanum 19) also stress an emphasis on the deck as a cosmic journey. The numbering system and the order in which the cards have been placed tell the story of this quest. As visitors to the gallery entered the space, they too undertook this journey.

⁴²³ Marteau, *Le Tarot de Marseille*, 65-68.

⁴²⁴ Alfred Jarry. *Ubu Roi*. (Mineola, NY: Dover Publications, 2003) v. For more on Jarry, see Alastair Brotchie, *Alfred Jarry: A Pataphysical Life* (Cambridge, MA: The MIT Press, 2011).

⁴²⁵ André Breton. *Anthology of Black Humor*. Trans. Mark Polizzotti. (San Francisco: City Lights Books, 1997) 211-225.

⁴²⁶ Place, *The Tarot: History, Symbolism, and Divination* 129.

They moved through the Tarot deck—if only symbolically—in the hopes that they might find occult wisdom, or at the very least a better understanding of Surrealism as it existed in 1947.

**KURT SELIGMANN, SURREALIST SCHOLAR OF OCCULTISM: *THE MIRROR OF MAGIC*,
ASTROLOGY, AND THE TAROT**

In a photograph from May 1948 [Fig. 61], artist Kurt Seligmann presides over a demonstration of magic held before an audience in his studio. The artist stands in the center of a magic circle with 4 words from the Kabbalah around the circumference: the names of archangels Raziel and Michael; “AGLA,” a conjuring term used in mystical exorcisms; and a final obscured term. Seligmann has placed magical objects around the circle. These include not only the typical provisions of a sorcerer—candlesticks, a human skull, and a small cauldron—but also Enrico Donati’s 1946 sculpture *Fist*, a clenched bronze fist, standing approximately sixteen inches high, with the conspicuous addition of two staring glass eyes.⁴²⁷ Standing within the confines of the ritual circle, Seligmann holds a wooden staff in one hand and grasps a small note card in the other, as

⁴²⁷ Donati was briefly associated with the Surrealist movement in the early 1940s. At his first one-man show in New York in 1942, he was introduced to both Breton and Duchamp and soon became involved in the activities of Surrealist artists living in exile. He helped organize the 1947 Exposition internationale du Surréalisme, the first exhibition of Surrealist art in Paris after World War II. While Donati has primarily been labeled as a Surrealist in related literature and museum exhibition, his work after the late 1940s revealed increasing stylistic eclecticism not in keeping with his early Surrealist output. For more on Donati, see Timothy Anglin Burgard, *The Surreal World of Enrico Donati* (San Francisco: Fine Arts Museum of San Francisco, 2007); Nicolas Calas, Maurice Nadeau and André Breton, *Donati* (New York: W. N. Dennis, 1949); Carter Ratcliff, “Enrico Donati: Manhattan Transfer,” *Art in America* 77 (May 1989): 174-181; and Theodore F. Wolff, *Enrico Donati: Surrealism and Beyond* (New York: Hudson Hills Press, 1996).

though about to read an incantation. He is joined in the circle by Donati, who holds aloft a lit candle on another long staff. A young, rapt audience sits around the studio, all waiting to see what will happen next.

Such an image perfectly captures Seligmann's role as the resident occult expert among the Surrealists. After joining the group in 1934, the Swiss-born Seligmann produced paintings and graphic works filled with reference to esoteric symbolism and arcane folklore.⁴²⁸ Seligmann also devoted a great deal of energy to the study of occultism, and his greatest impact on his Surrealist colleagues was as a trusted resource on a range of related knowledge. According to Martica Sawin, he collected over 250 titles on magic and the occult during his lifetime, many of which included rare or hard to find publications.⁴²⁹ Fellow Surrealists Leonora Carrington recalled that this library was always accessible to friends and fellow artists.⁴³⁰ Drawing from this extensive library, Seligmann published his 1948 book *The Mirror of Magic: A History of Magic and the Occult* in 1948.⁴³¹ This text, which served as an introductory handbook on occultism, was aimed not just at his Surrealist compatriots but also at a broad audience in America

⁴²⁸ For an extensive biography and appraisal of Seligmann's artistic output, see Stephen E. Hauser *Kurt Seligmann 1900-1962, Leben und Werk* (Basel: Schwabe & Co., 1997). See also Christie's, *Dada and Surrealist Paintings and Sculpture from the collection of Kurt and Arlette Seligmann*, Christie's New York, Wednesday, November 3, 1993 (New York: Christie's, 1993); and Martica Sawin. "Magus, Magic, Magnet: The Archaizing Surrealism of Kurt Seligmann." *Arts Magazine* 60 (February 1986):76-81.

⁴²⁹ Sawin. *Surrealism in Exile*, 115. See also Sawin, "Magus, Magic, Magnet," 78.

⁴³⁰ See Aberth, *Leonora Carrington : Surrealism, Alchemy and Art*, 66; and Sawin, "Magus," 78.

⁴³¹ *Mirror of Magic* was first published by Pantheon Books in English. The text was later reissued under the title *The History of Magic and the Occult* and has seen multiple editions and translations. See Kurt Seligmann. *The History of Magic and the Occult*. (New York: Grammercy Books, 1997).

and abroad. As such, the publication of his text documents the continued public interest in occultism at mid-century. Moreover, the text provides some insight into Surrealist understandings of occultism, including the astronomical occult practices of astrology and the Tarot.

In his introduction to the text, Seligmann writes that this book is aimed at a general reader and as an author he “make[s] no great claim to original scholarship.”⁴³² Moreover, Seligmann seems content to provide a brief sampling of occultism rather than a detailed account of any one specific occult practice. His text is divided into nineteen separate chapters and provides an overview of both occult practices and their history from their roots in ancient civilizations through the events of the eighteenth century. Seligmann specifically refers to astrology in his first chapter on Mesopotamian magic, and chapter 13, entitled “Portraits,” contains short biographical sketches of occult figures associated with astrology such as Agrippa and Nostradamus. Seligmann also includes a bibliography of works consulted on astrology, most of which date to the sixteenth and seventeenth centuries.⁴³³

In chapter 15, “Magical Arts,” Seligmann provides brief descriptions of various divinatory practices, and he devotes five pages to astrology.⁴³⁴ In his description, he

⁴³² Seligmann, *The History of Magic*, xxiii.

⁴³³ Seligmann lists 5 titles on astrology: Franz Boll’s *Sterngläubne und Sterndeutung* (1926), Luc Gauric’s *Tractatus Astrologiae* (1522), Junctin of Florence’s *Accesserunt Etiam Commentaria* (1583), William Lilly’s *Christian Astrology Modestly Treated of in Three Books* (1647), and Morin de Villefranche’s *ad Australes et Boreales Astrologos* (1628).

⁴³⁴ Seligmann, *The History of Magic*, 248-252. Other divinatory practices addressed in the text include chiromancy (palm reading) and the rather strange tradition of divination by moles found on the body.

writes of astrology's ancient roots in Egyptian, Assyrian, Persian, and Greek cultures. After acknowledging this history and also briefly describing traditional visual representations of the astrologer, Seligmann turns his attention to a definition of astrology. He writes, "Nothing depends on chance; everything is regulated and guided in a world built upon order. When man is born, the aspect of heaven impresses its seal upon his future."⁴³⁵

The rest of the chapter is largely devoted to a description and explanation of the signs of the zodiac and their correlations with the planets. While he does not include examples of birth charts or other related diagrams, Seligmann reviews basic terminology associated with the practice and talks about some of the interpretations of sun signs. His text does not provide enough information for a reader to successfully chart or make predictions. While Seligmann's sections on astrology provide little more than an introduction to the field and its extensive history, they do reveal that he had an interest in astrology and owned texts on the topic. Had Breton or any others in the group looked to him for information on astrology, he likely had both the knowledge and the book collection to aid his friends.

Toward the end of his chapter on "Magical Arts," Seligmann also addresses the Tarot. He devotes twenty-five pages to this discussion, far lengthier than his account of any other divinatory techniques.⁴³⁶ He draws his history of the Tarot from many of the same resources of which Breton was aware, including Court de Gébelin, Etteilla, Lévi,

⁴³⁵ Seligmann, *The History of Magic*, 249

⁴³⁶ Seligmann, *The History of Magic*, 271-285.

and Papus. As such, his history shows no knowledge of the Tarot's origins in fifteenth-century Italy. In brief, Seligmann sets up an ancient history for the Tarot that emphasizes the deck's mystical powers. He also remarks upon the deck's suggestive imagery: "The striking Tarot figures, specially the trumps or major arcan[a], appeal mysteriously and waken in us the image of our subconscious."⁴³⁷ Thus, the act of Tarot divination allows an adept to access concealed information otherwise inaccessible in much the same way that Surrealist artists and writers hoped to attain a link to the unconscious mind through their use of automatic practices.

Seligmann's research into these areas further corroborates the greater Surrealist interest in occult astronomy. Moreover, this text provided any interested fellow Surrealist with a basic introduction to astrology and the Tarot, as well as guidance on those resources most useful for further study.

SURREALIST ART, ASTROLOGY, AND THE TAROT: REMEDIOS VARO AND LEONORA CARRINGTON

In the existing literature on Surrealism and the occult, astrology is rarely mentioned. In her assessment of Remedios Varo's oeuvre, scholar Janet Kaplan lists astrology as one of several occult practices to which the artist was drawn as a source; however, she does not link specific paintings or other creative work to this interest.⁴³⁸ Kaplan is certainly not wrong in her assessment of the artist. Both Varo and her close

⁴³⁷ Seligmann, *The History of Magic*, 272.

⁴³⁸ Kaplan, "Remedios Varo: Voyages and Visions," 14.

friend and Surrealist colleague, Leonora Carrington, were deeply invested in occult phenomena phenomena. However, both women also found inventive ways in which to infuse their art with astrological meaning and associations.

Varo used her paintings to highlight a connection between man or woman and the stars, an idea of cosmic guidance that is the focus of horoscopic astrology. In works such as *La Llamada* [*The Call*], *Retrato de doctor Ignacio Chávez* [*Portrait of Dr. Ignacio Chávez*], *Creación con rayos astrales* [*Creation with Astral Beams*], *Icono* [*Icon*], and *Premonición* [*Premonition*], she stresses the role of the stars in determining our lives. Carrington also referenced astrological imagery in her work. In her own fantastic images, including *Le Grand Adieu* [*The Grand Farewell*], *The Garden of Paracelsus*, and *Sachiel*, she transposed circular astrological charts into her paintings as a means to create mythic and fantastic spaces, magic circles where occult rites take place.

That both Carrington and Varo included astronomical imagery in their work should come as no surprise, especially given their close friendship from the later 1940s until Varo's death in 1963. Varo first met Carrington in the later 1930s while still in Paris, but the two women became close when they both sought asylum in Mexico during World War II. Varo moved to Mexico with her lover and, later, husband, Benjamin Péret, a French poet and activist involved with Surrealism.⁴³⁹ Their shared home became

⁴³⁹ Varo first met Péret in October 1936, while still living in Spain. She later moved to Paris with him in 1937. Upon her arrival, Péret provided her with entrée to the Surrealists. Varo's turbulent marriage to Péret lasted until 1947, when he chose to leave Mexico and return to Paris. For more on Varo's relationship with Péret, see Renée Riese Hubert, *Magnifying Mirrors: Women, Surrealism, and Partnership* (Lincoln: University of Nebraska Press, 1994), 255-276.

an early meeting place for other European expatriates who escaped to Mexico.⁴⁴⁰ Varo and Carrington naturally gravitated to one another at such gatherings.⁴⁴¹ In subsequent years, the two met regularly, often discussing their shared interests in occultism.

Carrington recalled long sessions spent in Varo's kitchen, a space that Aberth argues served as a metaphor for their hermetic interests, a space to freely mix and concoct new fantastic ideas and approaches to art making bolstered by their shared interest in the occult.⁴⁴² Moreover, in their new home in Mexico, the two found themselves immersed in a culture in which there was little separation between mundane everyday life and myth as well as the supernatural.⁴⁴³

Varo's occult interests were further fostered in part by her relationships with Péret and Victor Brauner. Varo likely drew from Péret's publications and research on American and Pre-Columbian folklore and myth completed during his stay in Mexico.⁴⁴⁴

⁴⁴⁰ Kaplan, *Unexpected Journeys*, 86-88.

⁴⁴¹ For a discussion of Surrealist women living and working in Mexico, see Ilene Susan Fort, Teresa Arcq, and Dawn Ades, *In Wonderland: The Surrealist Adventures of Women Artists in Mexico and the United States* (New York: Prestel USA, 2012).

⁴⁴² Aberth, *Leonora Carrington : Surrealism, Alchemy and Art*, 60. For a lengthier treatment of Varo and Carrington's shared friendship, see Stefan van Raay, Joanna Moorhead, and Teresa Arcq, *Surreal Friends: Leonora Carrington, Remedios Varo, and Kati Horna* (Burlington, VT: Lund Humphries, 2010).

⁴⁴³ Tythacott, *Surrealism and the Exotic*, 184. As evidence of this, Tythacott relates Carrington's experiences in Mexico City's open markets where one was as likely to encounter household necessities being sold right next to magical herbs and ingredients and where food stalls were as common as booths run by healers, spiritualists, and brujas (witches).

⁴⁴⁴ Upon his arrest in 1940 for his Communist political affiliations, the Emergency Rescue Committee helped sponsor Péret's emigration to Mexico under the auspices that he would complete research on the folklore and mythologies of the Americas during his stay. For more on Péret, see Julia F. Costich, *The Poetry of Change: A Study of the Surrealist Works of Benjamin Péret* (Chapel Hill: University of North Carolina Press, 1979); J. H. Matthews, *Benjamin Péret* (Boston: Twayne Publishers, 1975); and Melanie

Earlier in 1938, Varo had had an affair with Brauner. And, as Kaplan records, the dates of their relationship coincide with Brauner's own intense exploration of various occult phenomena, including alchemy and the Tarot.⁴⁴⁵ Moreover, Varo demonstrated a lifelong affinity for occultism, reading extensively on the topic throughout her life.

Varo's artwork demonstrates the depth of her occult knowledge but also her own personal willingness to create anew from these sources. In works dating from the 1950s until her death, Varo's imagined beings seem incited to discover both higher truths and their own selves as though on some mystical quest for understanding. Astrological connections serve as just one more impetus on these personal journeys; her characters are quite literally compelled by their connections to astronomical bodies.

This cosmic guidance can perhaps best be seen in Varo's 1961 painting *La Llamada* [*The Call*] [Fig. 62]. A female figure glides through a strange, stone-walled passage. Her body exudes a brilliant amber light, and she seemingly takes no notice of the other figures, eyes closed and tight-lipped, which have been subsumed within the stone walls. These figures are frozen, unable to progress, while the central female appears to move steadily forward, propelled by some higher power. Her long auburn locks spiral up toward the heavens and are quite literally roped to a heavenly body; she seems to draw power from above, and she is able to continue on her way, it seems, in large part due to this cosmic link.

Nicholson, *Surrealism in Latin American Literature: Searching for Breton's Ghost* (New York: Palgrave Macmillan, 2013).

⁴⁴⁵ Kaplan, *Unexpected Journeys*, 65-66.

In her analysis of the work, Kaplan argues that the woman is “literally enlightened: light from the star to which she is attached suffuses her body with an otherworldly glow.”⁴⁴⁶ But, Varo here insists on more than simple enlightenment. This link to the planet or star above does not serve solely as a symbol for understanding; rather, the glowing woman appears to draw power from this connection, a purpose and willingness to move forward on her journey. In astrology, and particularly horoscopic astrology, personal actions and decisions are associated with the movement and position of stars and other planetary bodies. Varo’s glowing woman seems to gather momentum from her cosmic connection, her life inextricably entwined with the stars and planets above her.

Varo’s positioning of these astronomical bodies also connects this work with a more extensive knowledge of astrology. The heavenly body to which the glowing woman’s hair is connected appears too large for an ordinary star. A subtle ring at its center suggests that this is the planet Saturn. The three smaller orbs just to the left of this connection belie any comparison to a perfect sphere. Instead, they appear to twinkle and have irregular shapes. These are stars. Varo may have chosen the positioning of the three stars at random. However, in conjunction with the planet Saturn and assuming she had more than a cursory knowledge of astrology, the patterning of these three stars suggests one half of the constellation Cassiopeia. Named for the Ethiopian queen and mother to Andromeda from Greek mythology, the celestial formation is one of the

⁴⁴⁶ Kaplan, *Unexpected Journeys*, 167.

original forty-eight constellations identified by Ptolemy. In myth Cassiopeia was known for her extreme arrogance and pride; she boasted of her daughter's beauty and was later punished by the gods when her kingdom was flooded. Cassiopeia's lack of humility was forever remembered astronomically in the constellation bearing her name; five stars form a "W" shape, but in more detailed renderings, the queen is shown forever bound to her throne in the night sky. In *The Call*, Varo's placement of the three stars mimics the left half of the "W" shape formed by the constellation. The missing star of the "W" configuration may even be obscured by the woman's glowing auburn locks.

Beyond the twelve zodiac constellations and their astrological significance, other prominent constellations and stars are often assigned meaning and influences in more complex astrological systems. Ptolemy, in his *Tetrabiblos* [*Four Books of the Influence of Stars*] identifies the influence of Cassiopeia as equivalent to that of both the planets Saturn and Venus.⁴⁴⁷ By positioning what appears to be part of Cassiopeia so close to Saturn, Varo's work suggests some knowledge on the part of the artist regarding these correlations and astrological influences. Whether or not these connections are an accurate interpretation of the starry elements in Varo's painting, the planetary bodies and stars she depicts reveal a direct connection to her female figure. She is driven by the stars; her forward progress, her future even, seem directly tied to the heavens above.

In other works, Varo explores this same use of starry connection and astrological links to her characters. In *Retrato de doctor Ignacio Chávez* [*Portrait of Dr. Ignacio*

⁴⁴⁷ Ptolemy. *Tetrabiblos or Quadripartite Being Four Books of the Influence of the Stars*. Facsimile Ed. Trans. J. M. Ashmand. (Whitefish, MT: Kessinger Publishing, 1993) 19.

Chávez] (1957) [Fig. 63] three similar female figures, without glowing auras, move along a passageway. The first woman stops as she encounters and interacts with a male figure. This man, Dr. Ignacio Chavez of the title, reaches out from a large crevice in the stone walls. He points toward her heart with a small skeleton key, a fitting addition given that the painting was commissioned by a Mexican cardiologist.⁴⁴⁸

All three figures traversing the passage are linked to the stars above, this time with long, string-like extensions that loop around their elbows. These women are puppets for the stars above. Their every move is cosmically determined. Varo herself identified the constellation formed by the stars as Cancer, and she references a connection between the constellation and matters of the heart in sources on ancient physiology.⁴⁴⁹ This connection to the heart was yet another fitting reference to the work's commissioner. However, Varo also may have inserted her own biography and personal struggles, as she had in so many of her other works. Of the many men in Varo's life over the years, Péret probably had the greatest influence on her life and career—particularly her identity as a Surrealist. Born July 4, 1899, his star sign was Cancer. This painting may have served as a representation of this relationship and his effect on her life.

Varo's *Creación con rayos astrales* [*Creation with Astral Beams*] (1955) [Fig. 64] shows the formation of identity and personhood as directly tied to the stars. The scene takes place in a large irregularly shaped room with a large circular cut-out in the roof. A fully formed man sits in a chair in the foreground grasping a small hand mirror. And, in

⁴⁴⁸ Kaplan, *Unexpected Journeys*, 136.

⁴⁴⁹ Ricardo Ovalle, *Remedios Varo: Catalogue Raisonné* (Mexico City: Ediciones Era, 1994), 56.

the back of the space we see three large mirrors on stands. All four mirrors harness beams shooting down from the stars above, reflecting them toward a sketchy, half-formed figure in the center of the room. These beams serve to create this person; she is composed or, as the title suggests, created by these astral beams. The stars determine who and what she is, not unlike the ways in which astrology is said to predict personality traits, actions, and other personal characteristics.

The creation of a body using astral beams may also refer to the idea of an astral body or astral light, common in late nineteenth- and early twentieth-century occult philosophies. Most notably, Theosophy espoused a theory of five planes of existence, drawn from ancient Hindu and Sanskrit traditions. Surrounding the first, physical plane of existence is a second, astral plane, a realm of astral light connected to greater cosmic energies.⁴⁵⁰ While a theory quite separate from those espoused in astrology, astral light serves as a link to the greater macrocosm. While a rather simple comparison, both astrology and astral light maintain that existence is based on a series of cosmic connections.⁴⁵¹ In Varo's painting, the body created by these astral beams is cosmic in origin and indelibly linked to the heavens above.

Varo also depicted planetary spheres and crescent moons as having an almost mechanical effect on earthly events in her work. In *Premonición* [*Premonition*] (1953)

⁴⁵⁰ Theosophy's idea of astral light and the astral plane were first laid out in C. W. Leadbetter's 1895 book on the topic. See Charles Webster Leadbetter, *The Astral Plane: Its Scenery, Inhabitants and Phenomena* (Auckland: Floating Press, 2009).

⁴⁵¹ For more on the role of astrology in Theosophy, see Jutta K. Lehmann, "The Influence of the Theosophical Movement on the Revival of Astrology in Great Britain and North America in the Twentieth Century" (PhD diss., Concordia University, 1998).

[Fig. 65], two large spheres or planets are bound to a large pulley or flywheel system, which control two unraveling spools of thread. The thread glows an eerie white and seems to weave together on the ground plane, creating the white robes of four mysterious individuals. Three of these figures are clearly female, while a fourth, darker figure, approaching a craggy entrance to a castle at far left, is of indeterminable gender. Given Varo's love of mythology and folklore, these three women may be the Greek Moirae, more commonly known as the Fates. In her painting, the women are bound to the spools of thread. In myth, the Moirae controlled the destiny of individuals often metaphorically imagined as a thread of life.⁴⁵² Varo here connects a myth regarding the determination of life and death with a similar sense of astrological determinism.

In her work, Varo reveals a direct connection between her characters and the heavens above. Exhibiting varying levels of awareness, these characters are tethered to the stars and planets. Varo depicts their actions and their very existence as the result of astrological guidance. In contrast, Carrington's paintings include astrological symbols in canvases cluttered with references to myth, other occult practices, folklore, and magic. For Carrington, references to astrology create a backdrop for her fantastic portraits of occult figures and magical rites.

⁴⁵² For a brief description of these mythic women see: Pierre Grimal. *The Dictionary of Classical Mythology*. (New York: Wiley-Blackwell, 1996) 294.

Carrington, the daughter of wealthy British aristocrats, was drawn to the fantastic at an early age.⁴⁵³ As a child she was fascinated by tales of fairies, ghosts and other magical creatures culled from Irish folklore and Catholic mysticism and told to her by her mother and nanny.⁴⁵⁴ Following a series of expulsions from boarding schools and a troubled academic record, Carrington moved to London in 1935 to attend art school. It was during this time that she began collecting books on alchemy and other occult topics, as she looked to expand upon the fantastic tales from her youth.⁴⁵⁵ In the summer of 1936, she had her first taste of Surrealism when visiting the First International Surrealist Exhibition, held at the Burlington Galleries in London. Carrington later met Ernst at a party in 1937 and was smitten with the much older artist. Following this clandestine meeting, she followed Ernst to Paris and began producing Surrealist art.⁴⁵⁶

⁴⁵³ For more on Carrington's biography, see Aberth, *Leonora Carrington: Surrealism, Alchemy and Art*; The Center for Inter-American Relations, *Leonora Carrington: A Retrospective Exhibition* (New York: Center for Inter-American Relations, 1976); Leonora Carrington, *Leonora Carrington: The Mexican Years, 1943-1985* (Albuquerque: University of New Mexico Press, 1991); and Juan García Ponce, *Leonora Carrington* (Mexico City: Ediciones Era, 1974).

⁴⁵⁴ Aberth, *Leonora Carrington: Surrealism, Alchemy and Art*; 12-13.

⁴⁵⁵ Aberth, *Leonora Carrington: Surrealism, Alchemy and Art*; 23. Gloria Feman Orenstein has also published on occult themes as they appear in Carrington's short stories and other literary production. See Gloria Feman Orenstein, "Manifestations of the Occult in the Art and Literature of Leonora Carrington," in *Literature and the Occult: Essays in Comparative Literature*, ed. Luanne Frank (Arlington: The University of Texas at Arlington, 1977), 216-233.

⁴⁵⁶ Carrington was one of just two women whom Breton included in his 1945 publication *Anthology of Black Humour*. He compared her to Michelet's "Witch," so celebrated for both her "illumination of lucid madness" as well as "the sublime power of solitary conception." For Breton, Carrington was Surrealism's own young and beautiful witch, and she represented the "modern marvelous" perfectly with her inclusion of occult subjects in both her literature and her paintings. Despite having written this prior to the creation of the paintings discussed in this chapter, Breton had, by 1945, already recognized the presence of occult themes in her work. See André Breton, "Leonora Carrington," in *Anthology of Black Humor*, Trans. Mark Polizzotti (San Francisco: City Lights Books, 1997) 335-340.

Carrington's inclusion of astrological imagery dates to work from the late 1950s and 1960s. In paintings from this period, Carrington sought to create magical spaces where fantastic creatures, culled from both her love of folklore and her imagination, seem to meet and divine prophetic truths. Oftentimes, these meetings occur in magic circles, and, in some cases, Carrington transforms these circles into direct representations, varying in clarity, of the circular charts used by astrologers.

This use of astrological imagery is most evident in her painting *Le Grand Adieu* [*The Grand Farewell*] of 1958 [Fig. 66]. In the image, a man, dressed all in black, carries a smaller figure on his shoulders. This smaller figure wears a large round mask and a long, flowing red cape. The masked figure, with his right arm extended, seems to guide the pale-faced man on a journey across some unknown, arid landscape. The pale-faced man looks past the masked figure, up toward the heavens where Carrington has included stars, the moon, and other celestial bodies. It is almost as though the guidance the masked figure provides comes directly from the heavens, and the pale-faced man is inextricably bound to this knowledge, as he shoulders both the literal burden of the masked man and the figurative burden of his shared, cosmic knowledge.

Drawn directly behind these two figures, and taking up a large portion of the picture plane, is a circular chart with small notations close to the center and lengthier, illegible inscriptions around the outer circle. The division of the internal circle and the small symbols around its circumference help identify this as an astrological chart. Just below the outstretched arm of the masked figure is the symbolic notation for Pisces.

Proceeding counter-clockwise around the circle, Pisces is followed by what appears to be the notations for Aries, Taurus, and Gemini. This corresponds with a logical progression of the signs of the zodiac, but also reveals some understanding by Carrington of astrological charts and their symbolic components.

Carrington fills the rest of the canvas with ghostly, mythic figures, including gryphons, glowing figures on horseback, and a hyena surrounded by her cubs. Four radiant, white feminine figures at far right watch over the whole scene. The complete narrative in this painting, not unlike the bulk of Carrington's visual output, is a complex mix of imagined and seemingly occult elements. And, amongst these complex visual symbols and magical creatures, astrology takes center stage as a guiding force in the world.

Similar astrological iconography can be seen in other paintings by Carrington. In *The Garden of Paracelsus* (1957) [Fig. 67] Carrington again presents the viewer with mystic, shadowy figures, this time gathered around a central circular pattern inscribed upon the ground. The horoscopic symbols and other inscriptions do not appear in this image. Despite the unfinished or incomplete nature of this image, it may still represent an astrological chart given the preponderance of other cosmic symbols found in the work. Of the many animal and human subjects in the work, many appear as constellations. At center left, a yellow female figure sits astride a rearing black horse. The forms of both the woman and her steed are imposed over glittering stars. Just to the right of the center of the painting we see a man hung upside down. This is the Hanged Man of the Tarot,

the twelfth trump of the major arcana. His body is also formed by shining stars near his feet, hands, and chest. Finally, at the far right, Carrington includes a geometric sketch with each corner or point designated by a star. In this work, Carrington plays with the complex relationships man has with the cosmos and the way in which the stars both determine and are determined by man's experience of the world.

In all of these works, Varo and Carrington found diverse ways to visually represent the practice and significance of astrology. And, for both women, astrology served as a driving force in the magical lives of the characters they depicted. Much like their original interpretations of astrology, Varo and Carrington also included visual references to the Tarot in their paintings. These works do not readily address astronomical themes—the cards they borrow from do not include astronomical bodies. However, in keeping with Breton and Seligmann's understanding of the astronomical links between astrology and the Tarot, such images do deserve mention. Moreover, as previously addressed, Varo illustrated cards for the Jeu de Marseilles while awaiting passage to Mexico. Her contact with Breton during this period and her collaboration on this project may have allowed her to understand the basic connection made by occultists such as Wirth between the Tarot deck and astrology in, a link she may have shared with her close friend Carrington.

Varo's *La Huida* [*The Escape*] and *El Juglar* [*The Juggler*] and Carrington's *Portrait of Max Ernst* bear a resemblance to cards from the Tarot's major arcana. Both artists draw from this imagery as a means to create the fantastic settings and scenarios

typical of their oeuvre. Both also exhibit a keen awareness of traditional symbolism for the deck's major Arcana.

Varo also included imagery from the Tarot in paintings, using the deck's imagery as yet another magical source from which she might borrow when creating her fantastic scenes. Janet Kaplan notes that Varo enjoyed a Gypsy fortune-telling game, Baraja-Española.⁴⁵⁷ Often called the Spanish Tarot, these cards originated in Spain around the same time as Tarot deck in fifteenth-century Italy. This, coupled with her experiences creating cards for the Jeu de Marseilles, reveals that Varo had more than just a passing interest in the Tarot deck.

In many of her paintings, Varo's cast of creatures and bizarre humans are shown either fleeing from or located near a large, looming tower or tower-like mountain range. This can best be seen in her 1962 painting *La Huida* [*The Escape*] [Fig. 68]. Two lovers, transported in a magical, umbrella-like vehicle, move toward the towering mountain. In traditional interpretations, the Tower (Arcanum 16) is a negative card that symbolizes chaos and destruction. But it can also symbolize a type of freedom, although usually gained at a great cost.⁴⁵⁸ This freedom seems eminent given the escape implied in the title. And yet, the swirling smoke and craggy, towering mountain do not seem to offer safe harbor.

In her painting *El Juglar* [*The Juggler*] (1956) [Fig. 69], Varo reveals imagery borrowed from Arcanum 1, the Magician. Varo adapts the Tarot's magician, usually

⁴⁵⁷ Kaplan, *Unexpected Journeys*, 160.

⁴⁵⁸ Marteau, *Le Tarot de Marseille*, 69-71.

pictured wearing a jester's hat, to a more mystical rendition, a bearded man wearing a wizard's pointed cap. But, her choice of juggling as a magical activity links these two figures. Commonly associated with theatrical conjurers that performed tricks in public places, this trump is named the Juggler instead of the magician in some decks.⁴⁵⁹

Furthermore, Varo has added the Magician's wares, representations of the suit signs, spread on a table before the crowd, another common trope in Tarot illustrations. Varo's love of the fantastic and the occult makes this card a perfect fit within her body of work. The Magician suggests occult wisdom and power as well as creativity, all traits that Varo saw in herself.

Foremost among Carrington's paintings that include imagery from the Tarot is her 1939 painting *Portrait of Max Ernst* [Fig. 70], which captures the likeness of not only her lover but also her personal, mystical muse. While not a direct mirror of the Tarot, this portrait of Ernst suggests the Tarot's Hermit (Arcanum 9).⁴⁶⁰ The Hermit is most often depicted as a wise, older man usually wearing a cape and carrying a lantern. Carrington's painting of Ernst shows him as Lop-lop, his self-invented alter ego. He wears a huge feathered coat and carries a lantern. Within the lamp's glass appears the image of a horse, a repeated self-referential symbol in Carrington's work.⁴⁶¹ The Tarot's Hermit is primarily associated with self-reflection and knowledge, but, in relation to other

⁴⁵⁹ The Magician appears as "Le Bateleur" or the Juggler in the Marseilles Deck. See Marteau, , *Le Tarot de Marseille*, 9-12; and Place, *The Tarot: History, Symbolism, and Divination*, 130-131.

⁴⁶⁰ This analysis is indebted to scholar M.E. Warlick's similar analysis of the image. See Warlick, *Max Ernst and Alchemy*, 162-164.

⁴⁶¹ Aberth, *Leonora Carrington: Surrealism, Alchemy and Art*, 39.

individuals, the card represents a wise man who can help one find his or her way along an otherwise confusing path.⁴⁶² This seems an almost perfect summary of Carrington and Ernst's life together in the late 1930s, when Ernst helped introduce Carrington to the Surrealist circle.

The Tarot, like astrology, provided Varo and Carrington with a rich occult iconography from which they might construct their magical tableaux. Rich with hermetic suggestion, their paintings invite interpretation and mark a continued effort to visualize alternate realities. Moreover, Varo and Carrington's oeuvre provides further visual evidence of a multifaceted Surrealist interest in astronomy. From the late 1930s onward, occult practices increasingly fascinated Breton. His interest in astrology demonstrates an obvious relation to the larger Surrealist interests in the heavens. Breton also understood that the Tarot deck was linked to cosmic truths expressed in the symbolic correspondences between the major Arcana and constellations. Much like Seligmann, Breton shared his research and knowledge on such themes in his writing and in his organizational efforts for exhibitions and other collaborations. These astronomical divinatory modes gave the Surrealists an ample array of new images and symbols to borrow from as they composed their fantastic compositions of the heavens.

⁴⁶² Marteau, *Le Tarot de Marseille*, 41-43

Conclusion

Beauty alone can attune us to that which transcends our understanding—a butterfly's wing, a starry sky—and it alone can instantly bridge the gap between that which appeals to us today and that which attracted a human being similar to us hundreds or thousands of years ago.—André Breton⁴⁶³

Completed shortly after his arrival in Paris in mid-1922, Max Ernst's *Au Rendez-vous des amis* [A Rendezvous of Friends] [Fig. 71] depicts a small gathering of poets and intellectuals [Fig. 71]. Ernst pictures both his previous artistic associations, such as his Cologne Dada compatriot Johannes Baargeld, and his new-found creative partners, the young men who would soon come together to form the Surrealist group.⁴⁶⁴ They all sit or stand—Breton appears to have just jumped or even flown into the scene with his legs akimbo and a small red cape flowing over his shoulders—in a strange desolate landscape. The ground plane is a brown, stone ledge, and white, possibly icy, rock formations appear in the middle distance just behind the group. A black, boundless sky surrounds the figures, and just above Breton's outstretched right arm Ernst includes a diagrammatic representation of a solar halo, which, as earlier discussed, Ernst used in other

⁴⁶³ André Breton, "Caught in the Act," in *Free Rein*, trans. Michel Parmentier and Jacqueline D'Ambrose (Lincoln: University of Nebraska Press, 1995), 127.

⁴⁶⁴ Ernst's image includes a numbered key for those present at this gathering, which appears as two coiled sheets of white paper with neatly printed names at the bottom corners of the composition. Among those present, Ernst includes Renaissance painter Raphael, coyly tucked between Max Morise and Paul Eluard in the back row, not unlike the Renaissance artist's inclusion of his self-portrait in his famous painting *The School of Athens* or *Philosophy*, produced for the fresco cycle in the Stanza della Segnatura at the Vatican. Russian author Fyodor Dostoyevsky sits, just left of center in the front row, with Ernst perched on his knee. Other slightly incongruous additions to the scene appear in the back row on the far right. Italian painter and Surrealist precursor Giorgio de Chirico is rendered as a stoic, classical bust, and just to his left, later Surrealist muse and then-wife of Paul Eluard, Gala, gazes over her shoulder and at the viewer.

compositions and drew from his perusal of old editions of *La Nature*. The confluence of these young Surrealists, especially Breton, and this image of astronomical import is certainly suggestive. While other scholars have noted that the mountain-like setting suggests Ernst's recent trips to the Tyrolean Alps, where he first met Breton and Eluard, one might just as easily compare these desolate, craggy surroundings to the cratered lunar surface or some other, as yet unexplored, planet.⁴⁶⁵ Poised to disrupt the Parisian literary and artistic avant-garde, these young men gathered in this otherworldly realm ready to embark upon their own search for, as Breton describes it in the First Manifesto, "the superior reality" found in dreams, the mind, and even certain forms in our everyday life.⁴⁶⁶ Over the course of its existence, many among the Surrealists would find this "superior reality" in the vast territory of the universe and interplanetary space.

With each artist analyzed in this study, the approach to depicting and incorporating astronomical imagery into their work has varied greatly. The simplistic, sign-like astronomical bodies found in the work of first-generation Surrealists stand in contrast to the more imaginative depictions of occult astronomies, Einstein's space-time, or extraterrestrial life found in the work of second-generation artists. Despite this basic differentiation, each artist under examination used astronomy as one visual component in the creation of his or her own particular mode of Surrealist painting.

⁴⁶⁵ Charlotte Stokes identifies this connection to Tyrol in her account of Ernst's borrowings from *La Nature*. Alyce Mahon, among others, has echoed these sentiments in her descriptions of this work. See Stokes, "The Scientific Methods of Max Ernst," 454; and Mahon, "The Search for a New Dimension," 223.

⁴⁶⁶ Breton, *Manifestoes of Surrealism*, 26.

For Miró heavenly bodies became one part of his universal language of abstracted signs, and his Constellations series in particular mark a specific means of cosmic escapism from his wartime circumstances. Ernst's early body of work stresses a similar use of easily legible astronomical images. The latter's later visualizations of Einstein's space-time and his adoration of the unrecognized brilliance of Wilhelm Tempel document his continued interest in astronomical themes, but also serve as a bridge to the more innovative tactics of artists newly linked to the Surrealist project.

These second-generation artists joined the movement at a time when Surrealism was expanding to include a new variety of visual approaches and appropriate subjects. While many artists were still concerned with the application of automatic practices and bore some connection to the Freudian foundations of the movement, Surrealism was defined increasingly by a predilection for a more broadly defined sense of the unknown. For Matta, Paalen, and Domínguez, the remote, uncharted notion of outer space, as expressed both in the scientific findings of the new physics and in the visionary domain of science fiction, contributed to their own depictions of the strange or mysterious. While they all share a commitment to abstracted styles, each artist exhibited a unique approach to astronomy-related subject matter. . The vast empty spaces and fluid forms of Matta's version of space-time stand in stark opposition to the frenetic and ever-shifting geometry of Domínguez's depictions of the same basic subject matter. Paalen's luminous, almost-biological space ship glides over a planetary landscape, while Matta's version of space

travel is less a vision of the craft and instead reveals sharp, electric lines of force indicating the speed of interplanetary transit.

Varo also demonstrated a basic understanding of Einstein's contributions to contemporary science. However, her incorporation of Einstein's findings in her visual output has a magical aura reflective of science but more firmly rooted in fantasy. Her vision of Einstein is at once learned scientist and enchanted conjurer. Varo, her close friend Carrington, and even Breton all relied upon a similar fantastic definition of Surrealism to account for their incorporation of the Tarot and astrology in their creative output. For Varo and Carrington, in particular, astronomical elements—occult or otherwise—are one of many fantastical elements incorporated in the creation of a personal world of self-discovery and hermetic investigation.

While this dissertation has often highlighted the correlation between this fascination with cosmic imagery and the Surrealist quest to access the unconscious, an even more fitting comparison can be found in the group's continued search for the marvelous.⁴⁶⁷ Breton first mentions the marvelous in the First Manifesto of Surrealism, including a vague definition akin to notions of beauty. He writes, "Let us not mince words: the marvelous is always beautiful, in fact only the marvelous is beautiful."⁴⁶⁸ In his later novel *L'Amour fou* [Mad Love], Breton further notes, "Convulsive beauty will

⁴⁶⁷ For a brief introduction to Surrealism and the marvelous, see Hal Foster, *Compulsive Beauty* (Cambridge, MA: The MIT Press, 1993), 19-29.

⁴⁶⁸ Breton, *Manifestoes of Surrealism*, 14.

be veiled-erotic, fixed-explosive, magic-circumstantial, or it will not be.”⁴⁶⁹ He also describes the *trouvaille* or “the found object” as a stunning encounter with an object, otherwise thought ordinary or insignificant, as a sort of marvelous spark.⁴⁷⁰ Thus, the marvelous is a flash, a fleeting stimulus neither singular nor improbable, but often unobserved. In the decades following its formation, Surrealism’s primary focus on the unconscious waned. Instead, the artistic verification of the marvelous encounter became the underlying goal of Surrealist creative production. In another revealing passage from *L’Amour fou*, Breton contends,

At the forefront of discovery, from the moment when, for the first navigators, a new land was in sight to the moment when they set foot on the shore, from the moment when a certain learned man became convinced that he had witnessed a phenomenon, hitherto unknown, to the time when he began to measure the import of his observation—all feeling of duration abolished by the intoxicating atmosphere of *chance*—a very delicate flame highlights or perfect’s life’s meaning as nothing else can. It is to the recreation of this particular state of mind that surrealism has always aspired...⁴⁷¹

For those artists discussed in this study, the marvelous could be found in astronomical phenomena, be they scientific or occult. The Tarot and astrology show striking similarities to the marvelous encounter. In occultist practice, both rely upon otherwise mundane phenomena and information—the movement of stars and other planetary bodies or the simple chance sequence of cards in a spread—to portend information of great

⁴⁶⁹ André Breton, *Mad Love*, trans. Mary Ann Caws (Lincoln: University of Nebraska Press, 1987), 19.

⁴⁷⁰ Breton, *Mad Love*, 13.

⁴⁷¹ Breton, *Mad Love*, 25.

personal or worldly impact. As previously outlined, astronomy had become increasingly accessible to the general populace in the early decades of the twentieth century. However, while visually manifest in popular science literature, improved photographs, museums displays, and even occultist tomes, the heavens remained just beyond experiential reach. Much like Breton's navigator or learned man, the Surrealist artists under examination all found in outer space a domain for unpredicted encounters associated with the marvelous.

In 1969, Ernst again returned to cosmic subjects in his painting *Naissance d'une galaxie* [*Birth of a Galaxy*] [Fig. 73]. Rendered against a deep blue background, concentric dots radiate outward forming a many-ringed, luminescent form, the galaxy of the work's title. The image was completed the same year as the first moon-landing, man's first palpable encounter with space beyond his terrestrial experience.⁴⁷² In this moment, humans had achieved the seemingly impossible feat of interplanetary travel, but had found nothing or no one. Ernst's depiction of a newly formed galaxy imagines and provides a new, nebulous and elusive realm that might allow for the marvelous encounters afforded by the heavens and seen in earlier Surrealist compositions. Whether within our own constantly shifting and improved understanding of this universe or some other imagined cosmos, the heavens offered Surrealism an ample space for pictorial invention, fantastic exploration, and unpredictable encounters with the marvelous.

⁴⁷² Fondation Beyeler, "Max Ernst," accessed June 1, 2013, <http://www.fondationbeyeler.ch/en/collection/max-ernst>. This interpretation draws from a description of this work found on the museum's website.

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