COLORING SCIENCE OUTSIDE THE LINES:

THE POETRY AND PASSION OF JEAN PAINLEVE

by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Fine Arts

in

Science and Natural History Filmmaking

MONTANA STATE UNIVERSITY
Bozeman, Montana

April 2007

APPROVAL

of a thesis submitted by

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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the Division of Graduate Education.

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April 18. 2007

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ABSTRACT

The majority of current science films for popular audiences follow a formula that can best be described as conventional journalism. Artistic science films are rare, and historically they have generated outrage and distrust by the scientific community. In this paper, I explore the possibility that artful science films are a valid method of conveying the wonders of science to an audience. Underwater French filmmaker Jean Painlevé made films that strike a clever balance between art and science, and this unique fusion of divergent parts results in moving vignettes on the astonishing surreal beauty of the marine world. By considering the origin of the science film, by examining Painlevé's films and philosophy, and by investigating the role of art and science in society, I argue that artistic science films are valid educational tools that should be used to communicate the wonders of science.

INTRODUCTION

Nature films tend to be straightforward affairs . . . Rarely do they lead us to question our ideas about how we view other species, let alone humanity itself, nor do they regularly challenge our aesthetic assumptions . . . The pioneering films of Jean Painlevé do precisely this, and in the process they prompt us to reconsider not only the role of imagination in science documentaries, but also our strange devotion to inflexible categories of all kinds (Bellows and McDougall 49).

In a dizzying display of unique productions, underwater French filmmaker Jean Painlevé (1902-1989) innovated the science film by injecting it with imagination. He took the radical approach of fusing science with bold color, creative composition, poetry, and jazz music, much to the chagrin of many members of the scientific community. Painlevé was trained as a marine biologist and ran a small laboratory in the south of France, but his experiments extended beyond the Petri dish and danced the delicate boundary that distinguishes art from science. He toyed with fast and slow motion, magnification, and artful lighting of his curious subjects and their fluid surroundings, and the resulting films are mesmerizing, moving vignettes on the strangeness and beauty of life underwater. Painlevé had a tendency to showcase the unusual, and his films are an astonishing study of natural phenomena that invoke a sense of the surreal in the viewer (Barnouw 72).

His use of imagination sets Painlevé's films distinctly apart from many others in the science film genre, and his artistic treatment of scientific subjects triggered outrage in some members of the scientific community. In this paper, I will explore the origin and evolution of the science film; I will examine Painlevé's imaginative treatment of the science film; I will consider the distinctly different perceptions of art and science in

society; and I will ultimately argue that an artfully rendered science film is an exceptional educational tool.

A TOOL OR A TOY?

Painlevé's productions are aberrations from the typical science film, and were particularly unusual for the science films of his era. In order to examine how his films are drastically different, one must first consider the origin and evolution of science filmmaking.

Science and cinema first merged in the early 20th century, and scientists were initially thrilled at the new possibilities film held for their experiments. One critic describes the new role of film in the science community:

> The medium itself was relatively new, and scientists experimented with it by tinkering with film, film cameras, microscopes, and the parameters of exposure, magnification, and time. It was . . . the medium in which experiments could be recorded and analyzed (Landecker 121).

Scientists were amazed at how film could assist their experiments. Film could document, and it could also, through magnification and time manipulation, provide observation of previously imperceptible activity, particularly in the realm of microbial biology. Because film opened a "whole new realm of biological phenomena to examination and experimentation," there was suddenly an "explosion of [film] experiments … in scientific and medical disciplines [ranging] from astronomy to psychiatry" (Landecker 121).

Science film became an important device, not simply as a research tool, but also as an educational tool that could communicate science to scientists and non-scientists alike. Critic Hannah Landecker writes, "These experiments in film did not just offer new images of natural objects, . . . they were also a means of allowing people other than scientists to participate visually in the sights of scientific work and the mode of experimental looking." The "scientific gaze" was essentially opened up to other

participants. "Scientific films did not just teach audiences about things like cells but . . . suggested a very particular way of looking at the world" (123).

Science operates according to a clearly delineated method of obtaining knowledge about the world. For a science film to fit comfortably into this paradigm of science, Landecker claims the following about early science films:

> Spectators were never allowed to forget the technical means that made access to this reality possible; it was not *any* reality, but a scientifically mediated one, in which audiences were allowed to access the previously private, individual view of the lone biologist at the microscope (Landecker 130).

Scientists revered films that conveyed the unadulterated perspective of the lone biologist unobtrusively observing life. In 1910, medical officer Martin Weiser surveyed the uses of film in medicine. He praised film's ability to aid both research and teaching, noting how easily it could be transported from the laboratory to the auditorium. "No more fussing . . . and fumbling attempts to explain to the layman what science was about. The audience could just watch the film and see what the scientist himself saw" (Landecker 127).

Early science filmmakers attempted to implement an unbiased mode of recording and projecting the world; they tried to remove themselves from the films that they made. And yet every film is the culmination of decisions that a filmmaker must make, and every filmmaker, scientist or not, *must* manipulate his subject in some capacity. "Films are made by a long series of choices, from the initial framing of the subject to the final editing of a narrative form in terms of both images and accompanying words" (Landecker 123). Elements of film can be likened to human attention; we zoom in on one thing, we pan across to something else that catches our eye. Narration asserts

itself upon us just as our own thoughts do. A film tells the viewer to pay attention in a particular way, essentially framing the way we view the world, and in the case of science films, the way we view science (Landecker 129).

In the early 20th century, some science films were made specifically as experimental data and others were made as popularizations of science, and then there are instances where these categories begin to overlap. "Walter Benjamin wrote that one of the revolutionary functions of film would be to demonstrate that the 'artistic uses of photography are identical to its scientific uses.'" In his writings he wonders, "Which is more fascinating [for viewers]; [film's] artistic value, or its value for science?" The film techniques that were used to reveal scientific experimentation, including magnification, X-ray imaging, and flashbacks, were suddenly viewed by some as avant-garde and artistic (Landecker 128).

The fact that a scientific subject could be viewed as artistic led the scientific community to be highly distrustful of the science film. Some wondered if cinema could in fact be considered a "proper scientific tool" (Landecker 127). Jean Painlevé entered this arena and refused to restrict his science films to the view of the lone biologist at the microscope. He opted not for the "scientific gaze," but instead filled his frame with images inspired by the unique connection he felt to the poetic life forms that that danced under his own microscope.

Painlevé's pioneering films provide a unique take on science, and although he made other films exclusively for scientists, many in the scientific community did not accept the films Painlevé made for general audiences. A few scientists were outraged by the productions, and many considered his artistic approach to be a threat to the integrity

of science. In 1928, at a screening before the Academe des Sciences of Painlevé's first film, *The Stickleback's Egg*, one scientist stormed out, shouting, "Cinema is not to be taken seriously!" The irate viewer, though more vocal than most, was not alone in his strong opposition to Painlevé's film. One critic explains: "The prevailing attitude among scientists and academics was that cinema was frivolous, [and that] . . . entertainment was for the ignorant" (Bellows and McDougall 17).

Two decades after Painlevé, another underwater filmmaker with a drastically different approach initiated what some critics feel has become the science film's well-worn formula (Boxer 1). "[Jacques] Cousteau's adventurer style of filmmaking has set the standard for the genre," notes one critic, "[while] Painlevé's more personal and lyrical animal behavior studies have been left dangling, a root of cinema with untapped potential" (Bellows and McDougall xvii).

Cousteau's films were highly accessible; the viewer could participate in an exotic expedition and discover the world alongside an intrepid adventuring scientist. As subsequent years unfolded, many science films took on a shape inspired by Cousteau's productions, and today many science films still mimic this same formula. One critic explains:

> Today, as in Painlevé's era, the art/science filmmaker remains a rare breed, and the artful science and nature film a welcome aberration. For the most part artists have abandoned the science and nature film genres and allowed them to be defined by the conventional television journalism of Nova, National Geographic, the Discovery Channel, and the like (Bellows and McDougall xvii).

Wildlife films now inhabit the entertainment arena on broadcast television, and over time science films that reach popular audiences have evolved into a highly homogenous, formulaic genre. Critic Derek Bousé writes that depictions of wildlife on

popular television involve images that have been "manipulated, intensified, dramatized, and fictionalized . . . systematically, over decades" (Bousé 8). Bousé describes today's predictable broadcast science film:

> Like horror films, westerns, sit-com shows, and others, the success of wildlife films depends on their ability to appear unique while at the same time evoking familiar patterns. The idea is to present the audience with something recognizable, for which they already have conceptual categories (Bousé 5).

Competition with hundreds of channels, the need to appease advertisers, and the dwindling budgets for science and wildlife programming all contribute to keeping science films in accordance with a strict formula.

Science films have a long history of being expected to stay within a familiar mold. In the early 20th century, science filmmakers strived to create films that were deemed authentic by the scientific community; today science films must walk a straight line if they are going to get funded and receive airtime. Given these constraints, there has been little room for creative expression, or imagination, in the science film.

THE TEXTBOOK OR THE POEM?

Artful science and nature films are by no means superior to conventional journalistic science films, but they are extremely rare and have the unique ability to appeal to the viewer in a way that standard journalistic science films cannot. The difference between the two can be likened to the difference between reading a textbook and reading a poem. Each one inspires a completely different reaction in the reader, and both are valid techniques for exploring a subject.

As educated human beings, we tend to pride ourselves on intellect and often discount emotion, particularly when it comes to science. And yet emotions are powerful; they rule our thoughts, moods, and our perceptions of the world. The aim of most science films is generally to teach something to the viewer via the intellect; artful science films teach by appealing more to emotion, which is rare to encounter in science education. Jane Goodall was harshly criticized for allocating human names to the chimpanzees she studied in the early 1960s in Africa; as a scientist, it was considered highly "unscientific" to name and not number your subject. By naming one's subject, we admit that we are a part of the process. We are connected to what we see; we are not just observing without feeling from the sidelines. Scientists dedicate their careers to writing articles that contain no emotion or creative expression; they conduct experiments where their own presence is as absent as possible. The "scientific" approach to filmmaking is to put as little of the filmmaker into the film as possible. Film, however, is a medium where the filmmaker is very much at the heart of the process. What the viewer sees is ultimately the filmmaker's vision and choice.

By allowing an emotional connection to exist between the filmmaker and the subject, the film has the power to instill that same emotive connection with the viewer.

Artful science films are not superior to journalistic science films, but the prevailing attitude in the scientific community is that they are inferior. I believe that both films have value when it comes to educating the public about science, and Painlevé's films are the perfect example of how an artful science film can excite and engage the viewer.

ANATOMY OF THE FILMMAKER AND TWO FILMS

Jean Painlevé's science films are anything but ordinary. His films are hybrids of science and art, and they move like chameleons, ever undulating and changing, like the slippery subject matter itself. Painlevé composed the image in his frame as a painter might carefully color his canvas; he braided poetic narrative with scientific fact; he added an undercurrent of chaotic jazz music; and he was quick to implement the occasional splash of unbridled humor. One critic provides the following description of these unusual films:

> The films that Painlevé made . . . are an unsettling mix, slyly shifting tone and emphasis, starting from clinical matter-of-factness, they seamlessly move to poetically charged whimsy and macabre perversity. They can be droll as well as ghoulish, dreamlike as well as harrowingly detailed (Bellows and McDougall 49).

Painlevé's technique of juxtaposing jarringly different elements in his films is now signature of his underwater theater.

I will now dissect two of Painlevé's short science films in order to closely examine his tendency to mix elements of science with art. The first film I will examine is *Hyas and Stenorhynchus, Marine Crustaceans,* because it is a fine example of one of Painlevé's early artful science films. He made this film in 1929, on the heels of his controversial debut film for scientists entitled *The Stickleback's Egg*. I will not examine *The Stickleback's Egg* because it is a film that was made strictly for scientists, and it does not obtain the artistic elements I wish to consider.

Hyas and Stenorhynchus runs 13 minutes, and it displays two marine crustaceans well suited to their watery environs: a small crab camouflaged as algae, and a magnificent worm with fan-like cilia. The film opens with a dramatically lit image of

the crab *hyas*, and Painlevé narrates: "Each dresses in its own style . . . Algae on the tip of the nose is undoubtedly striking." He opens with humor and anthropomorphism, likening the odd appearance of the animal to the strange fashion humans sometimes wear. Next Painlevé shifts to a more stoic tone and relays scientific fact: "The *hyas* and the *stenorhynchus* are often difficult to distinguish from their environment. The *stenorhynchus* is slender, with long legs and large claws." In these scenes, the narration morphs from highly artistic to increasingly plain and descriptive.

Next appears an image of the crabs dueling, and Painlevé narrates: "Like all crustaceans, they are arm wrestling enthusiasts." In the next frame, the crab is walking. "Seen from above, the animal simply looks like a clump of seaweed out for a walk." The abrupt return to anthropomorphism in this scene confirms the undulating tendency of the narrator to shift and change from the artistic to the scientific, and from the scientific back to the artistic. The narrator is ready to play again, and likens his subject not to a fashion horse but this time to an arm wrestler. In this scene, Painlevé uses unlikely, playful analogies to get his basic point across: these animals display aggressive behavior toward one another. A repeated s-sound in this section of the narration lends the segment a poetic feel, a slippery sound reminiscent of water.

An image of the great fan worm appears, and Painlevé narrates this sequence in classic textbook style: "This worm lives in a tube and can extrude or retract its respiratory plume in a spiral." A glorious image of radiating cilia appears, brightly lit in contrast to the black background. "At the center of the breathing plume, the mouth." Painlevé next magnifies the creature until the image is obscure and resembles an abstract painting; thick arched stripes fill the frame. "High magnification shows the vibratory

cilia 1/1000th of a millimeter long covering the bronchia." He zooms now onto the cilia. "This movement circulates water and sends nutritious particles into the worm's mouth." This segment beautifully illustrates Painlevé's unique ability to playfully combine science with art. Each of the images is a feast for the eyes: strange exhilarating forms and motion fill the frame; rich texture and surprising contrasts in color are vivid even in black and white. These artful images are coupled with matter-of-fact scientific descriptions of breathing plumes, vibratory cilia, and bronchia.

The piece concludes with a return to poetic language. The fan of the worm undulates and Painlevé approaches it closer and closer in the frame. "Caress of the great fan worm," he sighs, as the movement continues in a soft dance. The final frame is an explosion of the plume, its rays streaming outward toward the viewer. "Following a classic spiral retreat: fireworks." He likens the movement of the creature to a gentle touch, and then ends with a glorious comparison of the dramatic swirl of cilia to colors trailing through a black sky at a carnival. This short film demonstrates Painlevé's imaginative, innovative approach toward exploring the wonders of science.

Sea Urchins is an 11-minute film that Painlevé created in 1954. He made this film 25 years after *Hyas and Stenorhynchus,* and Painlevé's now signature technique of seamlessly fusing art with science is glaring in this production. There are a few critical additions to this piece not present in the last: first, Painlevé opted to make the film in bold color, an invention that emerged in 1951 which allowed the filmmaker the freedom to compose his frame with even more impact (McGinn 1). Second, he included a musical score, and Painlevé's quirky soundtrack of choice includes "Organized Noise," which is essentially a cacophony of sound, along with the colorful rhythms of

"The Real Mambo." The music alone illustrates Painlevé's tendency to pair elements of chaos with elements of order. The added elements of music and color allowed Painlevé to further enhance the artistry of his underwater theater.

The film opens with an image of a cluster of sea urchins and a concise scientific description of the animals' color, shape, and average body size. The next two frames are radically different, displaying a close up so extreme of the urchin's spines that the creature is no longer recognizable. The magnification calls an architectural metaphor to Painlevé's mind, and he narrates: "They resemble Doric columns." The rest of the film proceeds in this same manner: matter-of-fact descriptions of how the organism eats and how its anatomy is configured, juxtaposed against narrated comparisons to pages in a book, clovers, fingernails, beaks, and ultimately, a serpent's head. The narrative reads like a stream of consciousness: Painlevé's imagination is ignited and he responds to the images with inspired language.

This film is dizzying in its display of color. Many of the images are artfully lit and display a radiant palette of yellows, soft greens, blues, and reds, all contrasted sharply against a deep black background. The specimen is eerie, almost otherworldly, and the alien-like creature with its bizarre modes of eating, digging, crushing, and loosening debris, when paired with the bright upbeat rhythms of the Mambo, is indeed a curious and baffling sight. Painlevé presents a strange new perspective on the familiar, making the ordinary suddenly appear entrancing and peculiar.

Both films demonstrate Painlevé's uncanny ability to weave science with art. Emotionally charged poetic language, melodic and discordant music, wild or subtle color, dramatic lighting, bold abstract composition, and graceful movement are all

interlaced with stoic scientific descriptions and definitions. The effect is the same in each of Painlevé's more than 200 films: life underwater is presented as fascinating, beautiful, miraculous even, and worthy of exploration.

ART VERSUS SCIENCE

Why is the pairing of art with science such an unusual combination? What about these entities is so different that their union should cause such an uproar? I would like to examine art and science in further detail, to explore how society perceives them and to consider their role as opposites.

What exactly is art? The quest to define art is an ongoing endeavor that dates back to ancient times. Critic Morris Weitz writes, "'Art' is an open concept, it has no essence, and it cannot be defined in the traditional sense . . . Thinkers have failed to find the elusive essence of art because there is none" (Plantinga 14). He continues by stating:

> Thinkers have defined art as "significant form", the expression of feelings, . . . the forms of feelings, . . . the interplay of forms, etc. None of these definitions have been satisfactory, perhaps because there is no essential character of art, no necessary and sufficient condition (Plantinga 14).

Critic Peter Lev strives also to define art, and comments:

> 'Art' refers to a human-produced object, text, or performance which has limited immediate utility (a sculpture is not a coat rack), but several layers of 'extra' meaning or value. Most prominent of these extra layers are beauty, affective power, and social meaning or insight (Lev 3).

While the debate over the definition of art is ongoing, philosophers and critics usually agree that art has no boundaries. Art is a concept that is flexible, loose, and open to interpretation.

Conversely, science is characterized by a stringent system of careful classification. Everything about the field is methodical, systematic, calculated, and precise. Critic Dorothy Nelkin claims that "scientific knowledge [is considered to be] the most important resource of the nation" (Nelkin 21-22). Science is cloaked in an

elite, unique, untouchable aura, and has been made to seem separate from and superior to all other fields. "Science is distinct from politics and beyond the clash of conflicting social values," writes Nelkin. She describes science as the "neutral source of authority . . .," (Nelkin 71) and insists that "science . . . rests on the presumption of honesty in a quest for truth" (Nelkin 25-26).

The peculiar relationship of science and art as opposites has captivated the minds of many critics and philosophers. One critic describes the evolution of this relationship:

> Coincident with the rise of modernism, scientists and artists contrasted their domains. Each defined the other by a near absolute opposition. Science began when artistic license was cancelled. Art began when the deadening industrial-mechanical ethos of science could be forcibly set aside. Art invented, science discovered (Jones and Galison 1-2).

As both a writer and a scientist, critic C.P. Snow is well acquainted with society's perception of science and art as polar opposites. He is an intimate member of both realms, and contemplates the "two cultures" of science and art (Snow 1):

> I believe the intellectual life of the whole of western society is increasingly being split into two polar groups . . . Literary intellectuals at one pole- at the other, scientists . . . Between the two [lies] a gulf of incomprehension . . . sometimes hostility and dislike, but most of all, lack of understanding. They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can't find much common ground (Snow 4-5).

Snow wages that the polar positioning of art and science is the result of many factors. "The reasons for the existence of the two cultures are many, deep, and complex; some rooted in social histories, some in personal histories, and some in the inner dynamic of different kinds of mental activities" (Snow 23). As both a scientist and an artist, Snow is in the unique position to not only recognize the significant distrust and misunderstanding that exists between the scientific and artistic communities, but he is

also able to formulate the opinion that to have these two domains at odds with one another is detrimental to society:

> There seems then to be no place where the cultures meet. I am not going to waste time by saying that this is a pity. It is much worse than that. The clashing point of two subjects, two disciplines, two cultures-of two galaxies . . .ought to produce creative chances. In the history of mental activity that has been where some of the breakthroughs come. The chances are there now. But they are there . . . in a vacuum, because those in the two cultures can't talk to each other. It is bizarre how very little of 20th century science has been assimilated into 20th century art (Snow 17-18).

Other critics note that art and science are in fact quite similar in terms of their processes and what they aim to achieve. Critics Jones and Galison write:

> In the production within laboratories and studios, in the power and ambition of art and science to capture the world, the two realms have been separated. What much of this focus on 'art' and 'science' as distinct *products* ignores are the commonalities in the *practices* that produce them. Both are regimes of knowledge, embedded in, but also constitutive of, the broader cultures they inhabit (Jones and Galison 1-2).

The same critics later write, "Science and art are both deeply important sources of knowledge. Both domains *make* culture, revealing how they mark both mind and matter in the process" (Jones and Galison 20).

For Jean Painlevé, art was the obvious and only appropriate avenue for conveying the wonders of science. While most scientists are steadfast in trying to maintain an image free of emotion and polarized from art, he felt compelled to describe his scientific discoveries in *terms* of art. He was enmeshed in the scientific community as a scientist himself, and yet he loathed the notion of science as equated with absolute Truth. "He eschewed scientific dogma, claiming science is fiction, and delighted in conflating fixed categories of all kinds" (Bellows and McDougall xiv). Painlevé could not repress the emotion he felt toward the natural world, and once mused:

> What special effects could have produced the magical ballet of freshwater microorganisms, arranged miraculously under the eyepiece as if in a

> kaleidoscope? What brilliant choreographer, what delirious painter, what poet could have imagined these arrangements, these forms and images! The camera alone possesses the secret key to this universe, where supreme beauty is identified at once with nature and chance: that is, with all that a certain traditional aesthetic considers the opposite of art (Bellows and McDougall 146).

One writer visited Painlevé's laboratory and became acutely aware that this scientist offered something entirely different to the field. He shares his experience: "There is something bohemian about Jean Painlevé's institute, something fresh, youthful, spirited, bustling, unconventional that challenges the mummified science of the Academy in the most insolent way" (Bellows and McDougall xv).

A handful of people adored Painlevé's revolutionary approach, and considered the filmmaker to be a genius the world was not yet prepared to appreciate. One critic writes:

> It is not certain, unfortunately, that this startling cinematic truth can be widely accepted. It harbors too much potential scandal at a cost to current notions of art and science. This is perhaps why local audiences protested against and declared as sacrilege the jazz music that accompanies the little underwater dramas in Jean Painlevé's film[s . . .] So true is it that the wisdom of nations is not always able to recognize when extremes touch" (Bellows and McDougall 147).

ACCEPTED AS ART

Scientists and artists responded quite differently to Painlevé's films. While Jean Painlevé would hold a precarious position within the scientific community throughout his career, the French avant-garde supported his underwater films from the start.

The fundamental purpose of the avant-garde film, writes critic Carl Plantinga, is to "encourage interplay between the image as a representative of reality and as a building block in a complex artistic structure." He adds that plot and climax are not the central focus, but avant-garde films are instead primarily concerned with style (Plantinga 179). In these films, "the viewer concentrates on patterns of form, movement, angle, and color" (Plantinga 175). Eric Barnouw explains that subscribers to the French avant-garde movement viewed avant-garde films as a pictorial art. These unique films explored variations of light, and they often involved fascinating compositional problems. "The interrelationship of forms [in avant-garde films] was always evolving, developing unexpected [and] mysterious dynamics" (Barnouw 71).

Painlevé's films match these criteria perfectly: the majority of his short science films emphasize the shape of marine fauna and the movement of forms underwater, while looking at the subject from an uncommon perspective, either magnified or eerily lit. Famed painter, ceramicist, and glass artist Marc Chagall had no doubt that Jean Painlevé was, above all else, an artist. Chagall described Painlevé's 1930 film, *Caprella and Pantopoda,* a study of skeleton shrimps and sea spiders, as "genuine art, without fuss" (Bellows and McDougall 19).

In 1934, Painlevé made *The Sea Horse*, perhaps his most famous film, which displays a male sea horse giving birth. The film was a tremendous hit among French

experimental filmmakers. One journalist writes:

> The Surrealists quickly caught on. Painlevé's world is a place in which mating looks like fighting, a kiss is a prelude to death, males give birth and branches walk…[His films are] mysterious, dreamy, sexy, and frightening, all the things the Surrealists wanted to be (Boxer 1).

Painlevé was more concerned with the curious mysteries of the world and less intent on knowing and naming. His fascination with the peculiar, inexplicable qualities of underwater life forms is apparent in each of his films. He writes a few eloquent passages about his reverence for his subject matter and the dangers of knowing too much:

> Does the complete understanding of a natural phenomenon strip away its miraculous qualities? It is certainly a risk. But it should at least maintain all of its poetry, for poetry subverts reason and is never dulled by repetition. Besides, a few gaps in our knowledge will always allow for a joyous confusion of the mysterious, the unknown, and the miraculous (Bellows and McDougall 119).

Painlevé saw curiosity as integral to human nature, and he writes of the process of science:

> We all seek, more or less consciously, to increase our knowledge of the unknown-if only out of a lazy desire to turn something that once required thought into something that no longer does. We then use this knowledge to predict, from a safe distance, phenomena in a variety of fields and to produce more and more fruitful hypotheses that we hope will finally explain Nature once and for all. It is the preservation of our species that is at stake and incites this eternal curiosity. . . . Let's distract our insatiable curiosity for a moment with the simple contemplation of natural givens: subjects of wonder, charm, or horror, whose mystery seizes us when we seek to understand and identify with them (Bellows and McDougall 119).

Painlevé was ultimately "too in love with realism to be a surrealist" (Boxer 1), and while he was a dedicated scientist, he viewed science as a mode of organizing the world, as a defense against the unknown mysteries that surround us. "It's no wonder the casual observer feels unsettled by the lack of order that seemingly rules over the planet's millions of animals," he once observed. "Our narrow minds need the comfort

of carefully crafted logic and clear delineation" (Bellows and McDougall 119).

In naming and classifying, science attempts to tame the wild, to order the chaotic. Painlevé, however, found himself quite at ease in the chaos, and pointed his lens directly at it. He was not afraid of the mysterious; he was content to meditate upon it, wonder about it, and then share his intrigue unabashedly with his audience. He pushed forth a new vision of the world, and of science, that was intricately miraculous and endlessly intriguing. One critic notes that Painlevé's films " . . . persuasively demonstrate that . . . the spirit of science can be as large as that of religion" (Bellows and McDougall 57).

THE NEED FOR WONDER

Near the end of his life, Painlevé grew disgusted with the trend he saw in documentary films. In his 1953 essay *The Castration of Documentary*, he writes: "To survive, the documentary is forced to become a public servant or a private one; that is, the filmmaker must walk a straight line. We need to break through the current barrier of indifference" (Bellows and McDougall 150). In the same essay, he acknowledges a gaping lack of innovation in documentary films, and asks of the filmmakers: "Are filmmakers completely devoid of new ideas or are they just spineless individuals in the pockets of producers whose sole concern is commerce? The unexpected, the unusual, the lyrical-all have vanished" (Bellows and McDougall 152).

In his later years, Jean Painlevé confessed that he always had a tendency to "mix things up," and throughout his life he perpetually exhibited " . . . a seriousness of purpose with a playfulness of spirit" (Bellows and McDougall 3). His films are exceptional tools for inspiring the viewer's curiosity and wonder about the marine world. His films teach, but their primary lesson is that science is fascinating, intriguing, and worthy of exploration. In a career that culminated in more than 200 films, he stepped away from the analytical, unbiased, observing role of the scientist and allowed himself to become transfixed by aesthetics, by the inexplicable magic and wonder of the natural world. Painlevé's daring films cast a spell of magical impression; they instill an unforgettable curiosity in the viewer, and it is this insatiable curiosity that make them such valuable tools for science education. The world needs films like these; science needs films like these, because viewers need to be inspired and curious in order to care about and be compelled to learn about our increasingly threatened planet.

Nature films typically *are* straightforward affairs. But Painlevé teaches us that they don't have to be. A science film can be both a textbook *and* a poem; it can

feel like music, poetry, philosophy, and dance (Bellows and McDougall 49). Science is a system of knowledge restricted to the domain of the mind, but Painlevé takes the viewer to the realm of the imagination and the heart, and he encourages the viewer to experience the same personal connection he finds with his scientific subjects.

Jean Painlevé worked at a time when a radical approach to science filmmaking was unacceptable to many people. He is absent from most texts that strive to define the documentary genre, and his genius is left largely untapped. These days he is having a bit of a revival. In the last several years, a new book examining Painlevé's career and philosophy was released, and a recent photography exhibit in New York City displayed his photographs and films. There is a newfound spark of interest in the pioneering filmmaker who literally jazzed up the world of science film (Boxer 1).

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