

ECOLOGICAL SCIENCE SERIES

Birth of Scientific Ecology

Eugenius Warming (1841–1924)

Patrick Matagne



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Birth of Scientific Ecology

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First published 2024 in Great Britain and the United States by ISTE Ltd and John Wiley & Sons, Inc.

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27-37 St George's Road
London SW19 4EU
UK
www.iste.co.uk

John Wiley & Sons, Inc.
111 River Street
Hoboken, NJ 07030
USA
www.wiley.com

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Library of Congress Control Number: 2023947134

British Library Cataloguing-in-Publication Data
A CIP record for this book is available from the British Library
ISBN 978-1-78630-929-7

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Foreword

In France, studies specifically devoted to the history of scientific ecology are recent, and their first authors can be counted on the fingers of one hand. The small group they formed was made up, in alphabetical order, of Pascal Acot, Jean-Paul Deléage, the late Jean-Marc Drouin (1948–2020) and Patrick Matagne, author, among others, of this book. All of them have published several acclaimed works, and have developed mutually fruitful and often esteemed scientific relationships.

Patrick Matagne is an outstanding historian of science. We only have to read his books and publications to be convinced. He holds a master's degree in history commenced under the supervision of Alain Corbin, then a doctorate in epistemology and history of science (on the history of scientific ecology) after defending a thesis on this theme in 1994 under the supervision of François Dagognet (1924–2015). He then became a lecturer at the IUFM Nord-Pas-de-Calais, then Poitou-Charentes Poitiers.

This researcher with vast knowledge is also a man of the field who knows what he is talking about, as he also holds a master's degree in Natural Sciences from the University of Poitiers. In 1998, after working on the Mesoamerican biological corridor, these degrees and scientific qualities led him to lead a seminar on the history of ecology at the University of Costa Rica's Faculty of Social Sciences.

His latest work cannot be reduced to a simple biography, however erudite, of the Danish biologist Eugenius Bülow Warming (1841–1924), the botanist most often regarded as the founder of *scientific* ecology. This book is far more important, because when we look at Patrick Matagne's work, we discover that its author combines all the scientific and stylistic qualities of his previous works.

Thus, the book resulting from his thesis entitled *Aux origines de l'écologie* and subtitled “*Les naturalistes en France de 1800 à 1914*” (CTHS, histoire des sciences et des techniques, 1999) presented remarkable originality: that of considering the importance of provincial naturalists, often non-professionals, in the emergence of modern ecological problems and, conversely, in the way they integrated into their “local” reflections the work of the first great ecologists. As a result of this book, the origins of scientific ecology, hitherto dated to the second half of the 19th century, can be traced back to the 1800s. This result is far from insignificant, which is no mean feat for a first major publication.

Similarly, the brilliant and profound introduction to *Comprendre l'écologie et son histoire* (Delachaux and Niestlé 2002) focused on the first North American nuclear explosion in the New Mexico desert in 1945. To my knowledge, Patrick Matagne was one of the first to highlight its tragically paradoxical importance, which ushered humanity into the “ecological age” by emphasizing the fragility and *vital* importance, in the truest sense of the word, of ecosystems.

This is why *Les Enjeux du développement durable*, the collective work he edited and published by L'Harmattan in 2005, does not represent a kind of editorial parenthesis in the reasoned publication of his research, but rather a fruitful transition. Indeed, the proceedings of the study days organized in 2003–2004 by the Espace Mendès France (Poitiers) mark a decisive stage in his work. Edgar Morin, who wrote the foreword to the work, made no mistake: this collection has contributed to bringing to scientific ecology what politics is most challenging for the future of the planet's civilizations.

It is therefore hardly surprising that *La Naissance de l'écologie* (Ellipses 2009), which focuses on the work of Eugenius Warming as a criterion for the scientific nature of this new branch of biology, is now inseparably perceived as describing not only the birth of a new science, but also of a new political awareness, if not soon a new morality. This latest book from Patrick Matagne has inherited the same qualities as his previous works.

The book's remarkable introduction takes the reader by the hand (the author is no stranger to this): “Eugenius arrived at his destination at around ten o'clock on July 8, 1863. After spending the night at Manoel's farmhouse, his guide since his arrival in Rio de Janeiro, they left the mules to travel the last few leagues still separating them from Lagoa Santa on horseback.” It sounds like the beginning of an adventure book, even if it is the beginning of a highly documented, wonderfully illustrated academic history of scientific ecology. And, as in an adventure book, the reader, trapped by curiosity, wants to know more and more about Eugenius. In this

respect, the use of first names introduces a welcome complicity between the biographer and his readers. Until now, we thought we were simply discovering a major founder of ecology, and that is what happens as we read on. But this founder is a human being, so essential that we often wish we had known him.

In this way, Patrick Matagne gives us a useful lesson in epistemology: despite what a superficial glance may suggest, science is never neutral, but always developed by sensitive human beings, in given material and cultural conditions. When he describes Warming's distress at learning of his mother's death in Lagoa Santa three months after leaving her, he is in no way concerned with anecdote, but paves the way to an innovative method of practicing the history of science, without which we would miss important aspects of the great Danish ecologist's thought.

Pascal ACOT

Doctor

Institut d'histoire et de philosophie des sciences et des techniques
CNRS, Université de Paris 1, ENS-ULM

Acknowledgments

Pascal Acot, a French pioneer in the history of scientific ecology and a historian of environmental sciences, climate and climatology, did me the honor of reviewing my text, with all the wisdom and high level of expertise that characterize him.

Jean-François Beauvais, a temperate and tropical botanist, whose analytical eye supported the writing of this book, was kind enough to mobilize his naturalist skills.

My gratitude to them goes beyond mere convention. Their encouragement has played no small part in the success of this work, for which I am – of course – solely responsible.

Introduction

Eugenius arrived at his destination around ten o'clock on July 8, 1863.

After spending the night at Manoel's farmhouse, his guide since his arrival in Rio de Janeiro, they left the mules to travel the last few leagues still separating them from Lagoa Santa on horseback. Eugenius had planned to stay there for two years, and would stay for an additional year.

"The morning was pleasant. Bluebell-shaped flowers and many others adorned the hills"; "the dew was like pearls in the grass", he wrote in his diary¹. At almost 800 m above sea level, on the vast plateau of what is now Minas Gerais, the temperature was mild at that time of the year². "I let my gaze wander over the large square in the center of town".

Although the square was vast, Eugenius was soon to discover that the "town" was no more than a "miserable village" with low-slung houses and streets made of earth, limestone and short grass, as his photographs show. In the early 19th century, Lagoa Santa had 500 inhabitants and 80 houses. Manoel pointed out the one he needed to go to. He entered and stood waiting while his guide went to inform the owner of the premises who was resting in his garden at the back. After his morning stroll, he usually enjoyed the shade of the biribá and palm trees³.

1 Pages 63–73 from Eugenius Warming's diary are published by Klein, A.L. (2000). *Eugen Warming e o cerrado brasileiro*. UNESP, São Paulo. Other extracts are taken from Prytz, S. (1984). *Warming Botaniker og Rejsende*. Bogan, Lyngø.

2 22°C annual average. The coldest month is July (average 18.8°C); the warmest is February (average 23.7°C).

3 *Rollinia laurifolia* (Annonaceae), *Acrocomia sclerocarpa* and *Cocos capitata* (Arecaceae).



Figure I.1. *Dr. Lund's house and garden, on the right in the image (public domain via Wikimedia Commons)*

Eugenius was nervous. He was about to meet the Danish scientist whose secretary he was to become. Then entered “a thin man with gray hair”. Peter Wilhelm Lund had passed the age of 60, Eugenius was not yet 22.

“To my surprise, he greeted me in German⁴. He was normally supposed to use this language with Mr Brent, who replaced me temporarily. I think I replied in German, but then he realized he would have to speak in Danish”. We can assume that Eugenius’ surprise must have been tinged with a certain amount of annoyance, given his strong patriotic feelings against the conquering German Confederation.

For the time being, dramatic news awaited him.

“After a few minutes of conversation, he [Lund] remembered that mail had arrived for me”; “the first letter I opened, with a strange sense of anguish, brought me paralyzing news: my mother was dead”. We can imagine the grief of the young man, an only child and fatherless, discovering that his mother had died on May 5, 1863, less than three months after his departure.

He landed in Rio de Janeiro on April 27 and stayed for five weeks. Far from Europe and his University of Copenhagen, he was delighted to discover the tropical nature surrounding the city. Like all naturalists, he observed, collected, drew, described and – a rarity at the time, given the technical difficulties that discouraged many beginners – used the bulky and fragile camera he had packed in his luggage

⁴ “*Ah, es ist Herr Warming, setzen Sie sich gefälligst Nieder*” (Ah, it’s Mr Warming, please sit down).

(Davanne 1867; Gunthert 1999, p. 205). Cautious and organized, he took a two-week photography course before his departure.

His uneasiness, and even his guilt, can be seen in the lines left in his diary:

It's true that I had received a letter in Rio from my mother's brother informing that she was ill, but, as he himself had said, there was no danger, as I had left her in very good health and as for many years she had never been ill, I didn't attach much importance to the fact.

His uncle, who took him and his mother in after his father's death when he was barely three, probably did not want to alarm him. In any case, if Eugenius had decided to return, he would have had to face another arduous journey by mule to Rio de Janeiro, wait for a ship to take him to Europe and sail for many weeks.

A strange coincidence: Lund also learned of his mother's death while on a study trip in Italy with the Danish botanist Joakim Frederik Schouw. Arriving in Sicily, they hired a cart and two mules, passing through Messina, Catania, Syracuse and Agrigento. In Palermo, Lund received a bundle of letters, including one from his cousin telling him the sad news. He returned to Copenhagen for the last time in the summer of 1831. With no family ties, he hesitated between settling in Paris or Brazil. According to Danish zoologist Johannes Theodor Reinhardt with whom he had an ongoing correspondence, his mind was already made up (Luna Filho 2007, p. 71 *ff*).

What does the face of young Eugenius, photographed at the age of 21 shortly before his departure for Brazil, express?

The half-length portrait shows a serious, almost austere face, with a bare forehead and hair swept back. He is wearing glasses, a pencil beard and a budding moustache. Photographs from this period have a certain frozen quality, due to the technical necessity of requiring the subject to remain motionless. This portrait, taken in a photographer's studio, has been retouched like almost all of them. The background is neutral, with only the upper part of the torso visible. He did not stare at the lens, his gaze seemingly lost in contemplation of a distant horizon.

The intention here was not to show the subject in a particular situation, unlike those naturalists captured in postures that give the illusion of movement while in their study, sometimes in nature observing a detail, magnifying glass in hand. Later, after a brilliant career, Professor Warming came to take his place in these "galleries of contemporaries", "photographic portraits of famous figures from politics, science and the arts", fashionable from the second half of the 19th century onwards (Rouillé

and Marbot 1986, p. 33; Gunthert 1999, pp. 13–14)⁵. These representations were intended to signify the social success or scientific notoriety of the person being “portrayed”. The physiognomy of the Swiss Johann Caspar Lavater was popular. Portraits were thought to reveal the personality, feelings emotions and even the soul of the subject.



Figure I.2. *Portrait of Warming at age 21 (Klein 2002, p. 19)*

When did Johannes Eugenius Bülow Warming conceive the project that would make him the author of the first treatise on ecology? What was it intended for?

Mr Launay, professor of history at the Université François Rabelais in Tours, warned his students: to shed light on an individual’s intellectual, ideological, political and spiritual journey, ask yourself where he was, what he was going through and what decisions he made when he was 20.

This is how the destiny of an individual would then be written.

No one better than Balzac knew how to play with the destiny of his characters. In *La Comédie humaine*, he takes up the biological notion of milieu, defined by Comte in his *Cours de philosophie positive* and extended to human societies, where individuals interact with one another. Balzac sought to grasp the laws governing the distribution of social species. He analyzed the decisions, behaviors and aspirations of his characters. Drawing on the animal nomenclature established by paleontologist

⁵ At the end of the 19th century, a snapshot was gradually mastered thanks to the introduction of the gelatin–alkaline combination.

Cuvier and zoologist Buffon, he aligned the physical and the moral (Cohen 2004; Matagne 2004; Collet 2019).

Eugenius was born on November 3, 1841, on the small Danish island of Mando in the Wadden Sea, the only son of Lutheran minister Jens Warming and Anna Marie von Bülow. Following his father's untimely death, his mother left the island to live with her young child on the east coast of the Jutland peninsula, near Vejle, where Eugenius attended school before completing his secondary education in Ribe, less than 20 km from his native island. Introduced to botany by a natural history teacher, he became familiar with the plants of the Jutland coastline.

He enrolled at the University of Copenhagen in 1859, the publication year of Darwin's *On the Origin of Species*. An opportunity to travel presented itself. Professor Reinhardt proposed that he leave for Brazil to become secretary to the zoologist and paleontologist Lund, whose assistant he had been. Eugenius interrupted his studies.

He left on February 17, 1863 and returned to Denmark in October 1866.

On his return, he completed his studies in Copenhagen, then moved to Munich and Bonn to continue his research. He defended his doctoral thesis in 1871, the same year he married – he had eight children – then became temporary assistant professor at the University of Copenhagen at the age of 32, and professor at the University of Stockholm from 1882 to 1885. He returned to his home university, where he taught until his retirement. He was also the director of the Botanical Garden, where his herbarium, drawings, photographs and diary are now kept. A pedagogue, he devoted himself zealously to teaching, publishing botanical textbooks that met with great success. A man of the field, he felt it necessary to take his students outside the walls of the university. To open them up to the concepts and methods of botany and plant ecology, the botanical garden was not enough.

His work was enriched by his travels, which brought him into contact with landscapes and flora from latitudes as diverse as Greenland, Venezuela, the Caribbean, the Faroe Islands, Scandinavia and Tunisia, not to mention short stays in the Alps and the south of France.

How did the opportunities, the ups and downs of a life spanning more than 80 years shape the pastor's son, who went on to become an internationally renowned scientist? What role did the unpredictable, the unexpected and the uncertain play?

To shed light on the work and the man, should we highlight his father's death before he could retain any conscious memory of it, but which led to his move to the continent? Or his encounter with a natural history professor during his secondary

school years? His decision to leave university before completing his studies and accept the offer to cross the Atlantic to become the secretary of an old scholar? The news of his mother's death, far from everyone and everything? The discovery of exotic flora whose physiognomy, so different from that of Denmark, turned his understanding of botany and botanical geography upside down; the great European conflicts that severely affected his homeland?

These questions, along with others, will run through this narrative, whose ambition is to make the life of Johannes Eugenius Bülow Warming intelligible *a posteriori*, although it was unpredictable *a priori*, like all human lives (Morin 2021, p. 29–46, p. 143).

PART 1

From Mandø to Lagoa Santa

Eugenius' Birthplace

1.1. A deprived small island

A traveler discovering the island of Mandø in the 1840s on a November day with low clouds heralding rain would not have had the most pleasant of impressions. Certainly, temperatures would be above zero all day long, but they would remain in the single digits.

Coming from the nearby mainland at low tide through a passage created by the sand bank and roughly protected by two rows of posts – which have to be rebuilt every spring – visitors would discover a hostile, wind-beaten environment, a low, marshy land. According to an 1839 map, the altitude did not exceed 5 m above sea level. The day-tripper was not to linger too long, as the low light would fade by 4 p.m. An unpaved road took you to Ny Mandø (New Mandø) in just a few minutes, where the first houses in the mist could be made out and, behind them, the church built outside the village, as tradition dictates. Visitors could then walk between the houses protected by the dunes, with their adjoining garden surrounded by hedges on the south side.

It was here that Eugenius was born on November 3, 1841, in the land of “eternal November”, in the words of Danish poet Henrik Nordbrandt. For him, in Denmark:

The year has 16 months.

November, December, January, February,

March, April, May, June, July,

August, September, October,

November, November, November, November (Nordbrandt 1986; Viegnes et al. 2020, p. 151).

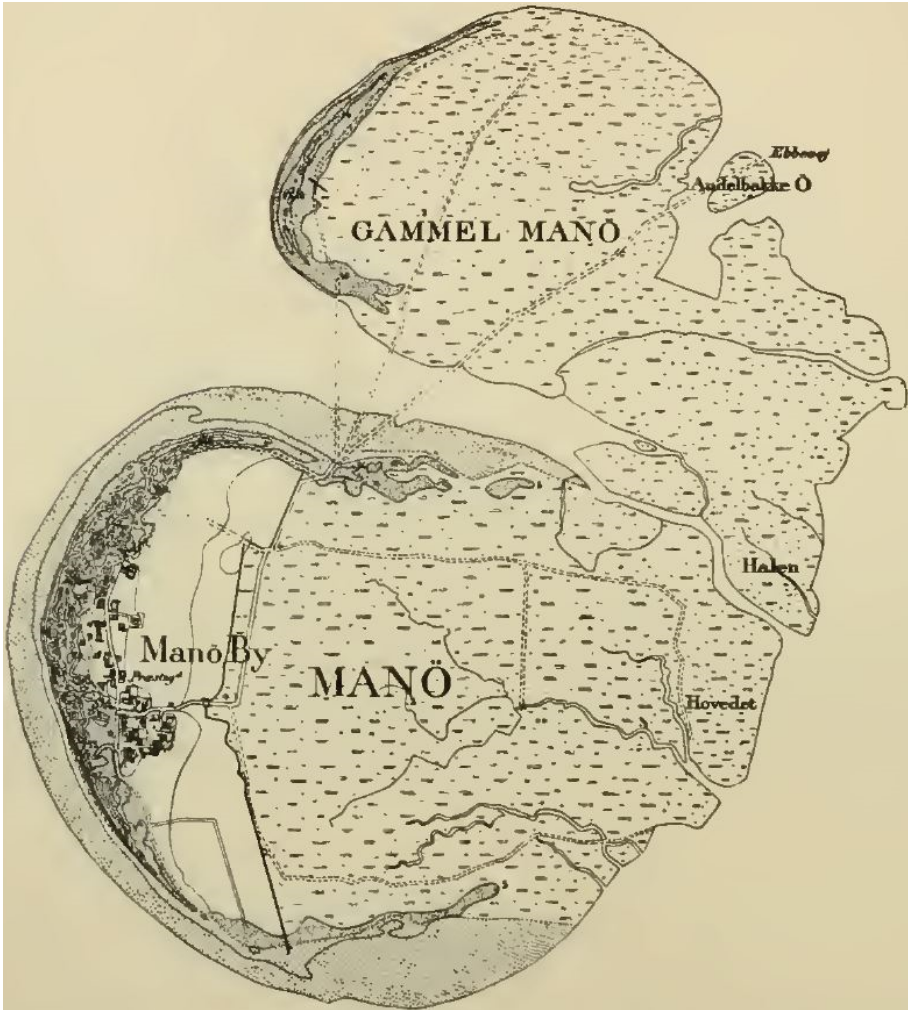


Figure 1.1. *The island of Mandø (Manø) around 1870 (copy of the bulletin of general staff) (Warming 1906–1919, p. 116)*

Mandø, Denmark's smallest island, is part of the northern archipelago of the Friesland Islands, which form a dividing line between the North Sea and the Wadden Sea. The island is separated into two by a channel. By the time of

Eugenius' death in 1924, the two parts had virtually fused together due to the relatively rapid silting up and filling in of the channel (Oorschot 2009)¹.

As an object of study, Mandø has long been deserted by historians and archaeologists for whom "the general idea is that nobody could ever have been so stupid as to live there, except if you were desperate, a monk or on the run" (Oorschot 2009, p. 3). The primary function of this desolate island would have been to house the graves of shipwreck victims.

The name Mandø first appeared in the literature in 1231. A church was mentioned in 1325. It was stated that it must pay four skilling sterling (silver coins) to the diocese of Ribe, on which it depended. There were three churches in the early 15th century. The present building dates from 1639, built on the highest point for safety. It was restored in 1727. Meanwhile, Lutheranism had implanted itself in the kingdom of Denmark–Norway under the reign of Frederick I. His son, Christian III, made the Reformation the national religion, and the University of Copenhagen became Lutheran. Royal property, the island of Mandø was bought at auction by its inhabitants in 1741. Traditionally, women were farmers on the island, in difficult conditions, as coastal marshland extends into arable land. Men were fishermen. Sailors, helmsmen, captains, they left their wives alone with their children, sometimes for weeks at a time.

The first school was built in 1776, with a home for the sole teacher. In 1884–1885, it was enlarged with the opening of a second class; by the end of the century, the island had a population of around 250 (92 farmers, 59 sailors, 22 industrialists and 13 tradespeople). There was a merchant, an innkeeper, two blacksmiths, a baker and a carpenter. An 1890 census counted 262 inhabitants but only 37 in 2013.

From 1870 onwards, the inhabitants tried to fix their island's dune complex with vegetation to protect them from recurrent flooding. To the east, a dike was built by the women in 1887 to protect their village. The same year, an unpaved road linked the island to the mainland, passable at low tide and outside of storms. By 1888, the dike ran all the way around the island, except to the south-west, where the village was protected by the dunes.

Women were the true administrators and custodians of their territory, against all odds. We imagine them as strong and pugnacious, guarantors of the durability of a people and a village built, destroyed, moved, rebuilt on unstable, shifting ground,

¹ Maps by Mejer (1651), Sørensen (1696, 1794, 1839, 1848, 1861, 1870, 1901 and 1910).

scanning the horizon beyond which the men disappeared and did not always return. The graves of the shipwrecked bear witness to this (Valdemar 1231; Geffroy 1851; Domeier and Haack 1963; Carré 1976).

The literature of the early 20th century liked to link the land to its inhabitants, in the tradition of German anthropogeography. The character traits of the Jutlanders, descendants of the ancient Cimbres people, are said to have been forged by the harshness of the farmers' toil and the fishermen's life, a harshness determined by that of the climate. The historical, geographical and economic studies on Denmark, published in particular to coincide with the 1900 World Fair, take up what has become commonplace, namely the opposition between the "alert" Fionian (from Hans Christian Andersen's native island) and the "cheerful" Selandese (on the larger island of Copenhagen), and the "overbearing and serious" Jutlanders, whether continental or insular (Denmark has over 400 islands) (Paul-Dubois 1909, p. 659).

What can we learn from Gammel Mandø (Old Mandø) and its tragic history? asks Leo Oorschot in a historical and archaeological study of *The Flooded Village of Mandø* (Oorschot 2009, p. 3).

In the 20th century, studies were being carried out into the consequences of the appalling storm of October 11, 1634, which washed away the dikes and ancient protection built in the 8th and 9th centuries. The "great flood" accompanying this storm led to the destruction of many villages on Denmark's west coast, between Ribe – opposite Mandø – and Tønder, 50 km to the south. On this terrible night, 500 people are thought to have perished. Ribe was reported to have a flood 6 m high. Gammel Mandø was reportedly unable to stand firm (Pontoppidan 1763–1781; Domeier and Haack 1963).

It is possible that the inhabitants took refuge in the dunes to the southwest of the island and set about building New Mandø (Ny Mandø), where Eugenius was born. But catastrophic floods were common at the time. It is not certain whether the flood of 1634 was the final blow to the village. Several authors mention another large flood in 1558, which caused half the population to flee. Those who remained escaped death by taking refuge on the roofs of their farms. After the tragedy, Svend, the island's first pastor, came to support the few families still clinging to their small island and decided to build Ny Mandø in the southern part of the island, protected by dunes and relatively higher above sea level. The story goes that the pastor did not hesitate to come from the mainland even when the ground was flooded. It became customary to say of someone who could make progress where others were sinking in the mud: "he must have Mr. Svend's boots".