

Sperm-force: a reconstructed history of George Newport's fertilization work

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Introduction

George Newport (1803-1854) is known for verifying that sperm enter the animal egg. However, he initially rejected that possibility (1850). He thought sperm communicate their fertilizing agency at the outer egg surface and called it "sperm-force." The Royal Society reviewers pressured him to remove his speculations in his second research paper on frog fertilization (1853). My research reconstructs Newport's reasoning for sperm-force. I argue that sperm-force was influenced by English interpretations of German *Naturphilosophie*.

Empiricists opposed Newport's speculations

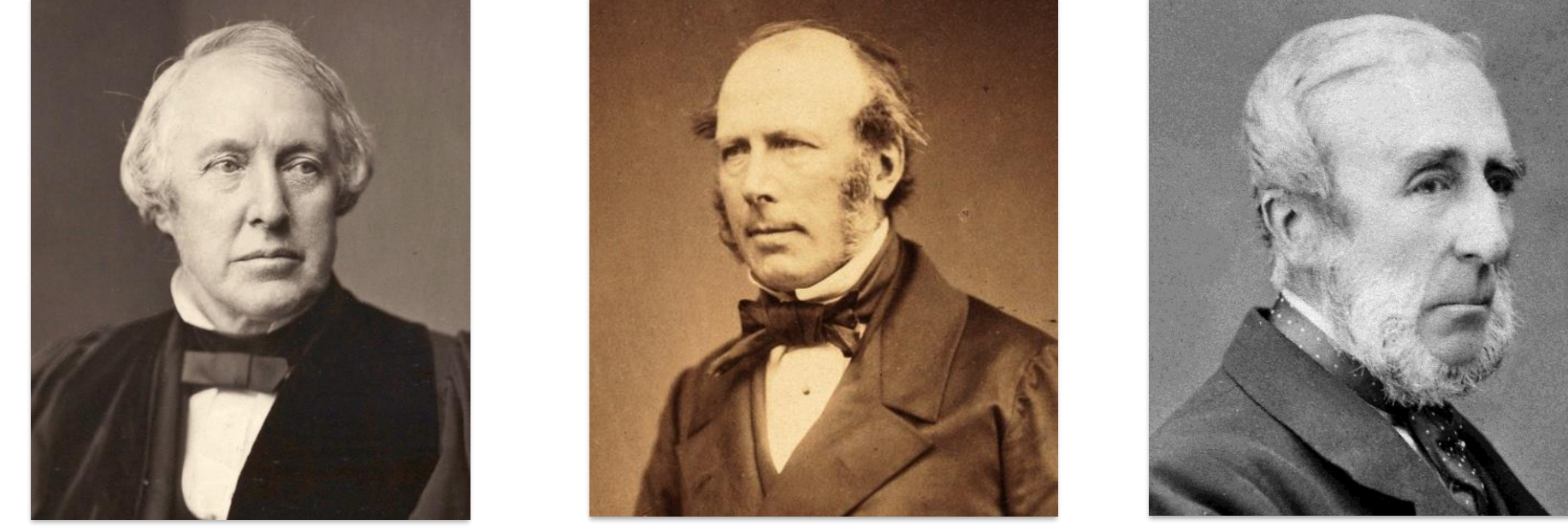
Linnean Society reviewers



William Spence

William Wilson Saunders

Royal Society Reviewers



Allen Thomson

William Sharpey

George Busk

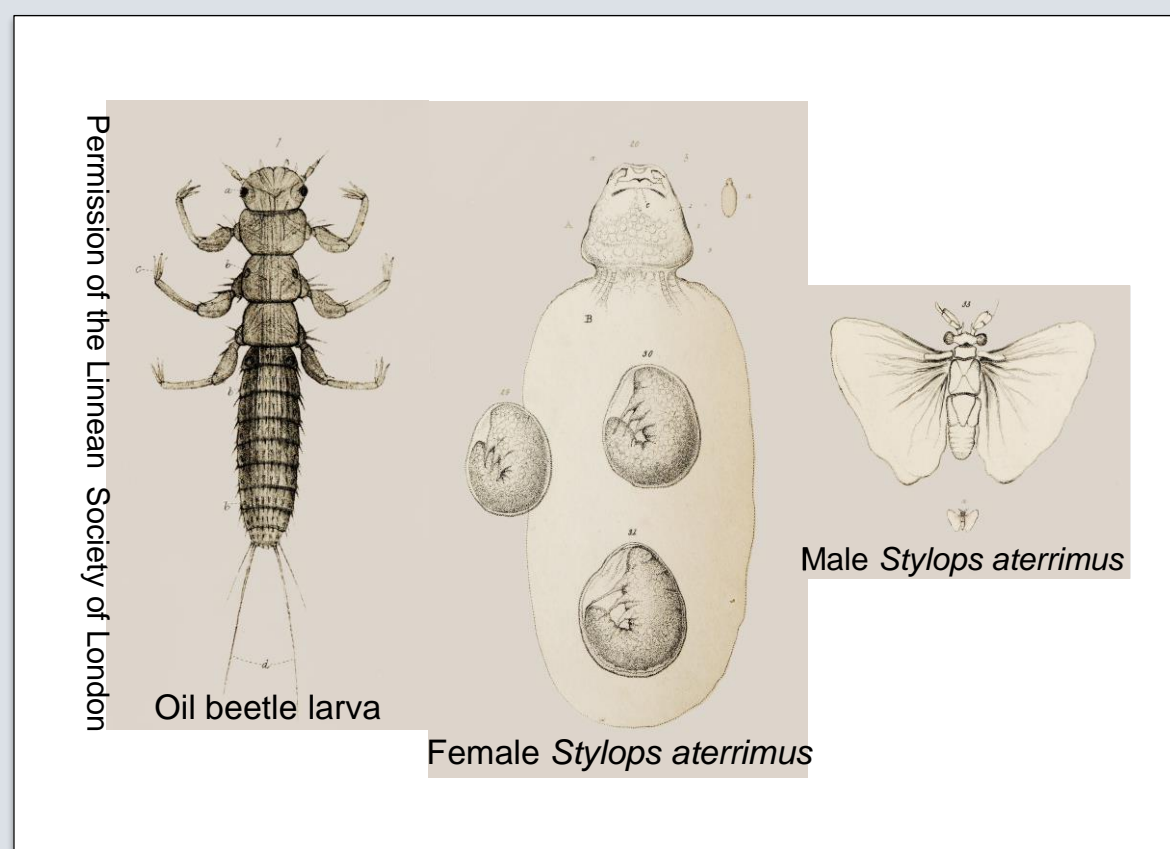
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Newport's vitalism

1845 Light and Instinct
1847 Sexual instincts

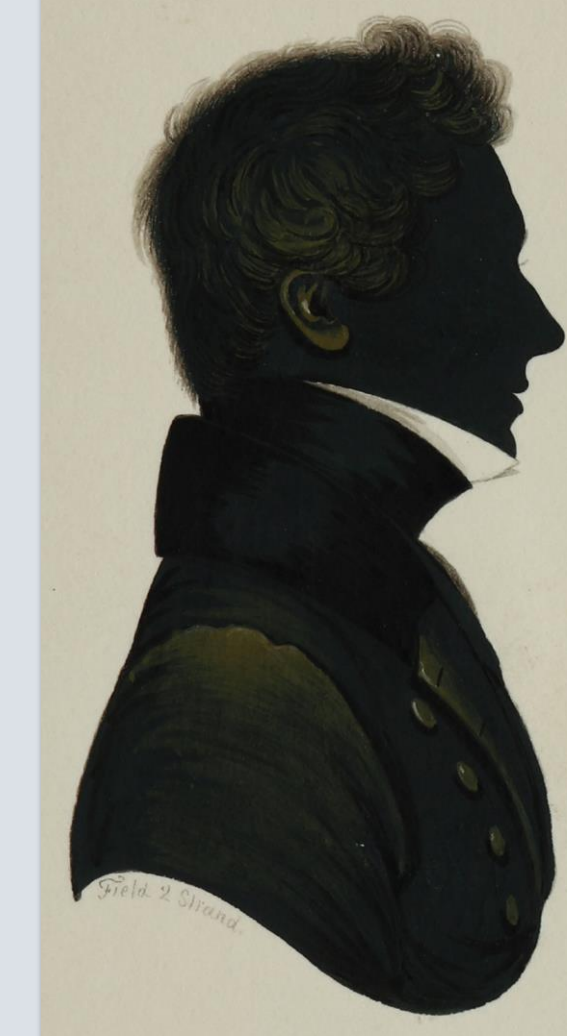
1850-1853 Sperm-force



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Male *Stylops aterrimus*

Female *Stylops aterrimus*

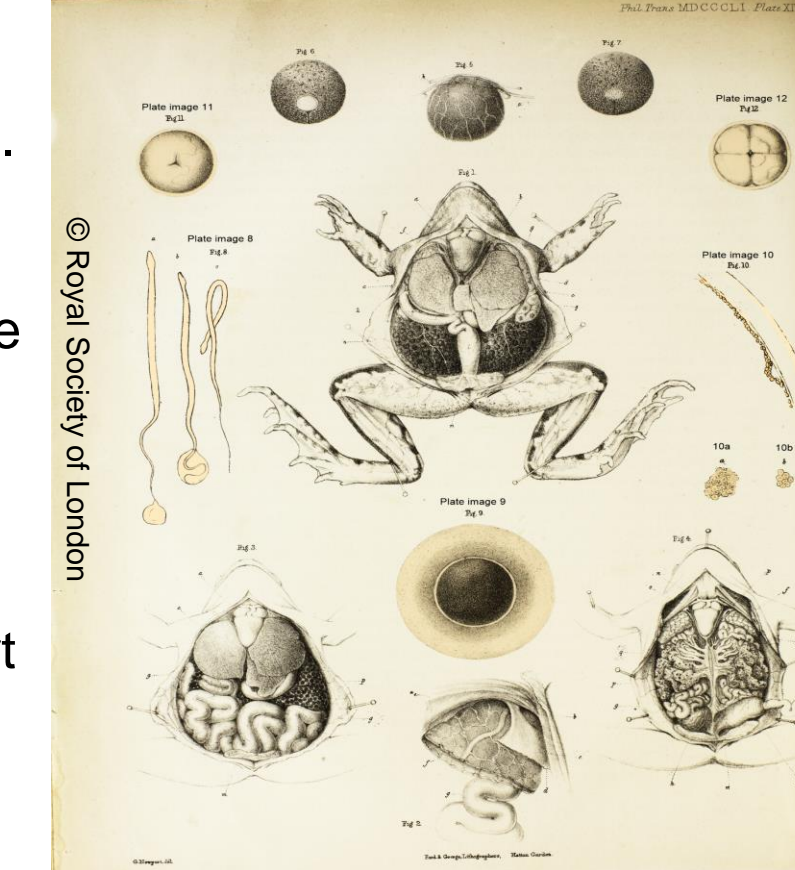


Only verified portrait of George Newport (1803-1854)

Newport's first Amphibian fertilization paper (1850) proposed a two-stage process.

First the sperm instantly communicate a male vital force to the egg's surface (later dubbed "sperm-force"). Then the egg sucks in the dissolved spermatoc material through its gelatinous envelopes. Newport discovered many changes in the egg that he correlated to sperm's agency.

Iconic plate from his first Amphibian fertilization paper 1850



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What is *Naturphilosophie*?

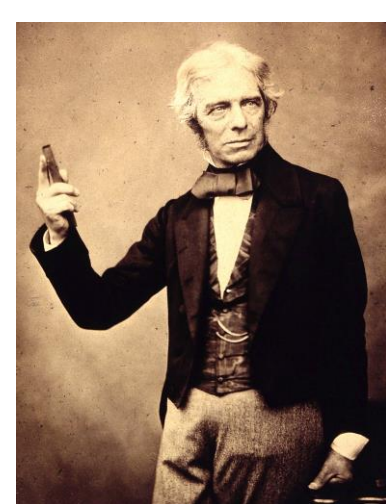
In his initial version of *Naturphilosophie*, **Friedrich Wilhelm Joseph Schelling** proposed that polarized principles create nature from which mind emerges. In his interpretation of *Naturphilosophie*, **Samuel Taylor Coleridge** constrained aspects that suggested pantheism to suit the British establishment.



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What was conversion or correlation of forces?

Scientists like **Michael Faraday** were demonstrating that imponderable forces like electricity, light, chemical affinity, and magnetism were interrelated and could transform into each other. Newport applied these concepts to his work on insect instincts and on sperm-egg interactions.



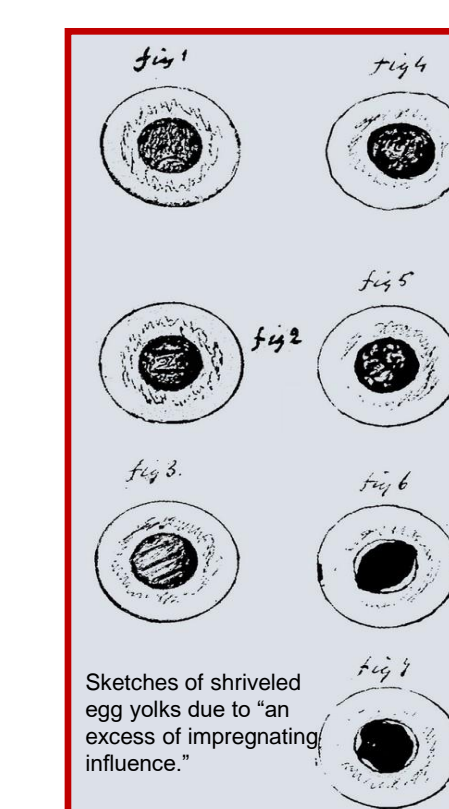
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In 1845 Newport said that light aroused insect instincts. When light shone on inert oil beetle larvae, they suddenly scrambled to towards the light. Newport called it the "polarization of instinct," which I argue was inspired by German *Naturphilosophie*. He related light's effect on instinct to the correlation of forces hypothesis. He saw sexual dimorphism in the parasite *Stylops* as proof that sexual instincts and behaviours depend on specific structures, which informed his ideas about sperm.

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1851-1853 Newport's openly argued for sperm-force in his second paper submitted in June 1851. Pressure from Nelson and Royal Society reviewers converged on this paper.

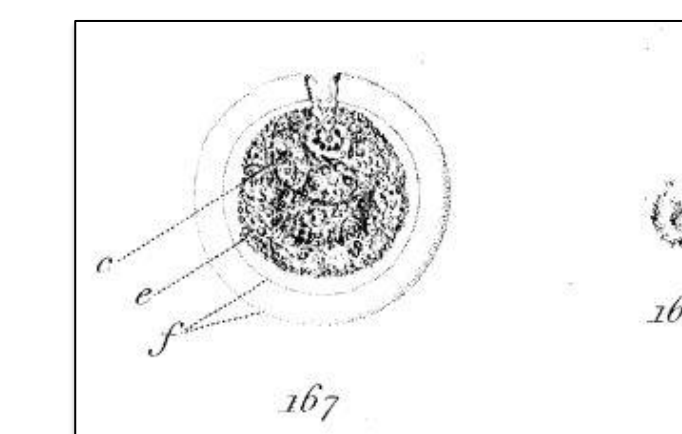
Newport invented new techniques to witness sperm penetrate the vitelline membrane and yolk. He revised his views of sperm-force in 1852 but then removed it from the published version in 1853



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Newport's Vitalist Competitors

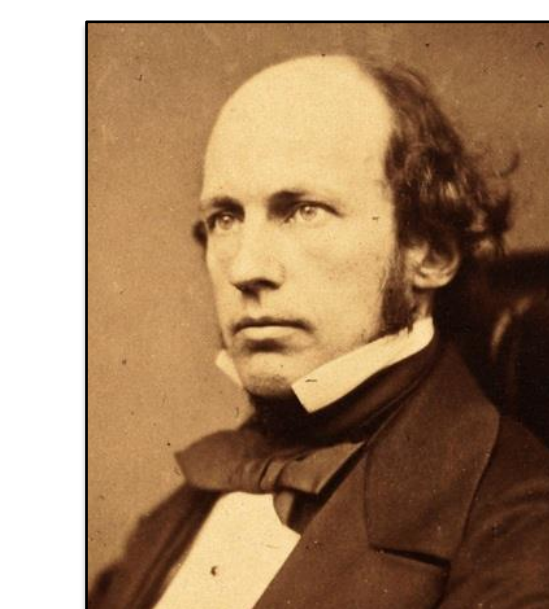


1839-1853: **Martin Barry** claimed to observe sperm in the rabbit egg, which led to a public argument with Theodor Bischoff in 1844. Barry said that sperm enter the egg via a fissure; however, Newport could not find it in the frog egg.

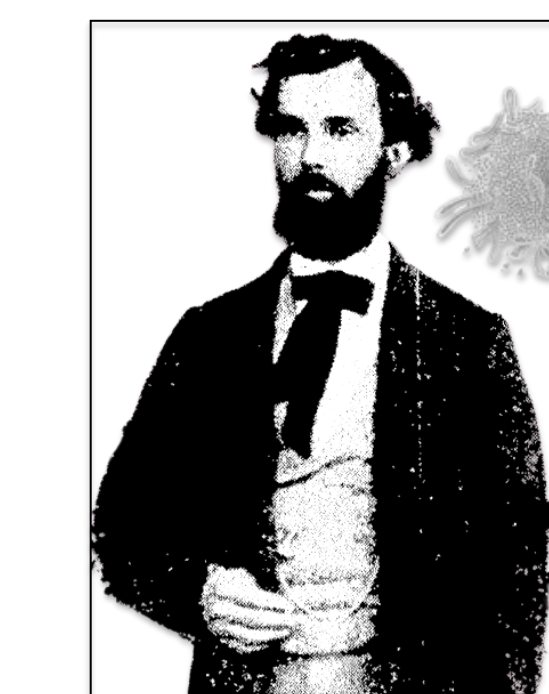


March 1849: **Richard Owen** proposed that "spermatoc force" explains the alternating asexual and sexual reproductive cycle of aphids. The timing suggests that Newport was influenced by Owen's concept.

Reciprocal Relation vs. Mutual Relations
In the summer of 1850, Newport and his friend **William Carpenter** wrote similar papers that applied the conversion of forces theory to organisms. Each man claimed they were the first to propose this idea. Other naturalists were competing for similar recognition. Carpenter proposed that the cell's fabric converts inorganic forces into "cell-force," which produces specialized vital forces.



June 1851: **Henry Nelson**'s paper demonstrated that sperm penetrate the egg of the cat parasite. This created a crisis for Newport's idea of sperm-force. Newport subsequently revised it to include that sperm penetrate the vitelline membrane.



References

Coggon, Jennifer. Sperm-Force: *Naturphilosophie* and George Newport's Quest to Discover the Secret of Fertilization. *J Hist Biol* 55, 615–687 (2022). <https://doi.org/10.1007/s10739-022-09696-3>

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Newport tested the conclusions of influential spermatologists



Lazzaro Spallanzani 1780s

Dumas and Prévost 1824–1827

Theodor Bischoff 1840s

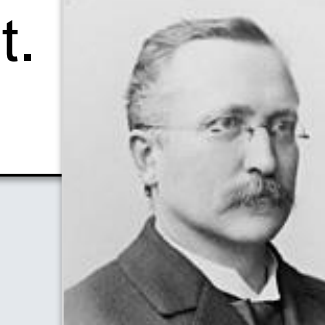
1853-1854

In his third paper, Newport correlated the sperm contact point, first yolk division, and the embryo's spinal axis. He also predicted where the head and tail would form. I argue that **Lorenz Oken**'s version of *Naturphilosophie*, which proposed that male polarity sparks mental development, influenced Newport's conclusions.



1854 and beyond

April 1854: Newport died at age 51. Theodor Bischoff verified Newport's claim that sperm penetrates the egg. In the 1880s, **Wilhelm Roux** rediscovered Newport's work. Embryologists today remember Newport's observations of spermatoc penetration of the egg yolk and the early stages of embryonic development.



Conclusion

Newport's colleagues had a stake in his observations and conjectures about sperm-egg interaction. Empiricists disliked Newport's theorizing and vitalists vied for priority over the correct interpretation of sperm agency in fertilization. My research unearthed Newport's concept of sperm-force and traced its influences to British interpretations of *Naturphilosophie*. This view may be relevant to current arguments that hierarchical attitudes about gender are implicit in 19th century research on sperm.