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Evelyn Hutchinson in his laboratory at Yale University in 1939.

BIOGRAPHY

Ecology's midwife

John Whitfield reflects on Evelyn Hutchinson, who transformed natural history into an explanatory science.

Foundations tend to be hidden. So it is with the ecologist Evelyn Hutchinson. Little known outside his field, his ideas shaped the discipline of ecology as it is today. In her exhaustive biography, ecologist and science historian Nancy Slack pays tribute to his contribution and, between the lines, shows why he remains in the shadows.

Hutchinson did not make great discoveries. Instead, he made a series of great suggestions, pioneering a variety of approaches to study how plants and animals interact with their environment and with each other, and, in turn, how these interactions affect the diversity and abundance of living things. In doing so, he helped to turn natural history into ecology, transforming a discipline whose practitioners described what they saw into one where they sought to explain it. Several of his ideas have blossomed into subfields that continue to occupy researchers.

Born in 1903 to a family of scientists, Hutchinson went to university in his home town of Cambridge, UK. He never earned a doctorate; after graduating he spent brief spells in Naples, Italy, where he studied octopus physiology with little success, and South Africa, where he began working on lakes. He then moved to Yale University in New Haven, Connecticut, where he spent 43 years on the faculty. Lake-dwelling insects, an enthusiasm since childhood, became his model system, which he used to devise and test ideas throughout his career. He completed the fourth and final volume of his classic *A Treatise on Limnology* (Wiley) just before his death in 1991.

G. Evelyn Hutchinson and the Invention of Modern Ecology
NANCY G. SLACK
Yale University Press: 2011. 457 pp. $40, £25

Hutchinson's ecological career can be split into two periods. From about 1930 until the 1950s, his work focused on how chemical and physical conditions affect living communities. He was among the first to use radioactive elements to trace the movement of nutrients through an ecosystem, and performed some of the first biogeochemical studies, writing a lengthy book on guano.

From the late 1950s on, his interests shifted to population and community ecology — or, as he put it in a famous lecture, "Why are there so many kinds of animals?" He highlighted the conundrum that competing species coexist. If you make them live in close proximity in experimental conditions, he noted, only one will survive. Yet in the wild, many can live together even in apparently homogeneous environments, such as the plankton in lakes.

Hutchinson argued that species occupy different niches, dividing up their environment along axes of space, time, the availability of light, water or food, and so on. He pioneered mathematical approaches to these problems, analysing how species might exert forces on one another through competition for space and resources, or reach equilibrium. The two phases of his work seem very different, but are united by his attempt to find general explanations for structure and patterns in the living world by applying ideas and techniques from chemistry, physics and mathematics.

Hutchinson's appeal lies both in what he did and in the way he did it. His approach was amateurish in the best sense, driven by joy and curiosity. He was interested in everything, and published papers and books on illustration in medieval manuscripts and decoration in Asian art. He was a gifted writer, and his essays in *American Scientist* won him a broad following at the time; a collection of his writing has been reprinted in *The Art of Ecology* (Yale University Press, 2010). He was a brilliant teacher, and had a knack for attracting the brightest graduate students and helping them to realize their potential. He was as much the midwife of modern ecology as the parent.

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Slack got to know Hutchinson in the last year of his life during a sabbatical at Yale. She has obviously read every available document and interviewed every relevant person willing to talk. Her biography is scholarly and a labour of love. But it is less than the sum of its parts. Some of the details could have been sacrificed in favour of a more coherent narrative or strongly argued thesis — I didn't need to know, for example, how many pages of references *A Treatise on Limnology* contains. Everything Hutchinson did, everywhere he went and everyone he met seems to be here, but the book says little of what it meant. It is difficult to see the wood for the trees.

The picture of Hutchinson beyond his intellectual life is hazy. The letters and papers quoted reveal little of the inner man, and he seems not to have discussed personal matters with friends or family. This was not for a lack of anything to discuss. His life had its share of sorrow, including a divorce and two further wives who predeceased him. We hear little about Hutchinson's politics, even though he declined to accept the President's Medal of Science from the administration of Richard Nixon, and little about his faith, even though he was a churchgoer.

There is no hint of anger, bitterness, feuds or egotism, despite some brutal office politics. Yale's biology department turned its resources away from organismal biology in the 1960s towards molecules and cells, resulting in many of Hutchinson's former students being driven from their jobs. Even for someone of his generation, class, nationality, gender and profession, Hutchinson seems unusually reticent. With so little to work with in creating shades of character, Slack's book reads more like a tribute to the work than a portrait of the man.

"Hutchinson's approach was amateurish in the best sense, driven by joy and curiosity."

The work however, deserves its tribute. Hutchinson's questions about ecological competition still provoke argument. There is disagreement on whether what we see in nature owes more to predictable forces such as niche differentiation, or if life is structured mainly by chance and history, and whether grand and general theories are applicable to ecology. Hutchinson's concepts are very much alive: they are part of the discipline's furniture. ■

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CULTURE

Natural colour

Colin Martin views a showcase of zoological art — and a dodo painting that misled scientists for 400 years.

A macaw, one of more than 2,000 watercolours commissioned by John Reeves in the 1800s.

A display of rare and fragile illustrations selected from the world's largest collection of natural history paintings and drawings opened this week in a new gallery at London's Natural History Museum.

Restored to its nineteenth-century glory — with terracotta-tiled walls and mahogany display cabinets designed by the museum's original architect, Alfred Waterhouse — the gallery hosts temporary exhibitions of light-sensitive watercolours and prints alongside permanent hangings of oil paintings from the museum's vast collection.

The museum's holdings of 500,000 zoological and botanical illustrations include two copies of John James Audubon's nineteenth-century masterpiece *Birds of America*, containing 435 hand-coloured engravings. The work became the world's most expensive book in December 2010, when another copy was auctioned for £7.3 million (US$11.5 million).

Owing to the fragility of works on paper and lack of a suitable exhibition space, few items from the collection have been routinely displayed to the public. A different theme will be chosen each year. This year it is China: 96 watercolours drawn from 2,000 natural history paintings from Canton (now Guangzhou) will be shown.

The paintings were commissioned by John Reeves, a tea inspector for the British East India Company and a keen amateur natural historian. Between 1812 and 1831, he employed local Chinese artists to paint plants and animals he found in markets and gardens. Reeves shipped the watercolours to botanical gardens, horticultural societies and other patrons in Britain. A contemporary take on his collection is offered by the gallery's recent artist-in-residence, Shanghai-based Hu Yun, who reflects through drawings and video on the irony that the watercolours that enabled taxonomists to identify and name new species were painted by anonymous Chinese artists.

The displays also juxtapose microscopic views old and new. A small engraving of a human flea, observed under an early compound microscope by Robert Hooke and described in his *Micrographia* (1665) as "adorn'd with a curiously polish'd suite of sable Armour, neatly jointed", holds its own against a huge image of a bluebottle by contemporary artist Giles Revell, based on scanning electron micrographs.

Images of Nature Gallery
Natural History Museum, London. From 21 January 2011.

Another pair of paintings highlights the importance of scientific accuracy in natural history illustration. In a reworked version beside the original, palaeontologist and artist Julian Hume shows how a 1626 oil painting of a dodo, attributed to Flemish artist Roelandt Savery, misled scientists and the public for 400 years. Richard Owen, the Natural History Museum's first superintendent, placed fossil bones over the seventeenth-century painting to determine the layout of the bird's skeleton, and his interpretation, published in 1866, became the recognized scientific description of the dodo. Its rounded body, stout legs, huge head and small wings became a comic cipher for extinction. But Hume shows that the painting was inaccurate. He depicts a more streamlined dodo with longer legs, based on his examination of new fossil finds, contemporary accounts and studies of the anatomy of other flightless birds. ■

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