exceptional, pathological, or disturbed". He concludes that "what Adam Smith famously described as the human propensity to 'truck, barter and exchange' has always coexisted uneasily with a rival temptation to take, bully, and extort."

The Company of Strangers is highly readable and will be accessible to a wide audience. It is, however, weak on detail and eschews formal model building and extended analytical argumentation. As a result, it will serve only as a stepping-stone to the field for those interested in the economy as a dynamically evolving system. ■

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Hidden history

Adolf Butenandt und die Kaiser-Wilhelm-Gesellschaft: Wissenschaft, Industrie und Politik im "Dritten Reich"
edited by Wolfgang Schieder & Achim Trunk
In German
Wallstein: 2004. 456 pp. €34

Benno Müller-Hill

Adolf Butenandt was the greatest non-Jewish German biochemist of the past century. In 1933, at just 30 years of age, he became a professor at the University of Danzig. At 33 he turned down an offer to become a professor at Harvard and accepted the directorship of the Kaiser Wilhelm Institute of Biochemistry in Berlin-Dahlem, his predecessor, Carl Neuberg, having been sacked by the Nazis on account of his Jewish ancestors. Butenandt went on to receive a Nobel Prize in 1939 for his work on female sex hormones.

Together with Alfred Kühn, Butenandt solved the biochemical problem of the eye colour of mutant *Ephestia* moths, and convinced the chemical industry to finance his research. After the Second World War he became an influential figure in the Max Planck Society, which succeeded the Kaiser Wilhelm Society, serving as its president from 1960 to 1972. A biography of Butenandt by his former student Peter Karlson was published in 1990 but was little more than a hagiography: Butenandt was portrayed as being an immaculate scientist.

But in the records of the DFG, the country's main research funding agency, lurks another story, which came to light in 1983. The human geneticist Otmar von Verschuer told some colleagues in 1946 that his collaborator Josef Mengele had sent him 200 blood samples from the Auschwitz concentration camp, and that Günter Hillmann, who worked with Butenandt, helped with the analysis. Another of Butenandt's colleagues, Gerhard Ruhenstroth-Bauer, had meanwhile been helping Hans Nachtsheim to test children for epilepsy in a low-pressure chamber belonging to the Luftwaffe. During Butenandt's lifetime, the Max Planck Society turned a blind eye to these facts. But two years after Butenandt's death in 1995, Hubert Markl, the society's president at the time, set up an independent committee to investigate the society's past.

ULLSTEIN BILD

Top secret: Adolf Butenandt tried to destroy evidence of his research.

Butenandt had left his entire collection of papers to the society's archive, but stipulated that they remain closed to the public until 2025. Markl decided that this did not apply to members of the committee investigating the society's past. The first person granted access to the letters was science historian Robert Proctor. His findings, which appeared in 2000 as a preprint of the committee's report, were devastating. He revealed that von Verschuer had written to Butenandt disclosing that Hillmann was helping him to analyse the Auschwitz blood samples. Butenandt then asked Hillmann to destroy his (Butenandt's) documents marked "Geheime Reichssache" (top secret) before the Russians arrived. Hillmann arranged for them to be sent to Butenandt in Tübingen, but they then disappeared. We still do not know their secret.

The committee has now produced this book, edited by Wolfgang Schieder and Achim Trunk, which contains a dozen articles on various aspects of Butenandt's life. The committee is proud of the fact that it was written by historians, not scientists. Perhaps the most surprising aspect is that Proctor's article is not included. So what does the book tell us instead?

Schieder has written a piece about the best science in the Weimar Republic and the third Reich. He claims that Butenandt was a member of a nationalistic, anti-Semitic fraternity — he was no Nazi by ideology, but shared some of their views. Schieder's most startling discovery is that Butenandt was accepted as a Nazi party member on the same day in May 1936 that he was appointed as director of the Kaiser Wilhelm institute. Party membership was apparently the price he paid for the position.

Helga Satzinger writes about Butenandt's relationships with women. He accepted women in science only as technical assistants, and then only if they were single and attractive. He went on to marry his own technical assistant, who came from a high-class family, and they had seven children together. Butenandt never supported the two female professors in his faculty at the Kaiser Wilhelm institute.

A chapter by Hans-Jörg Rheinberger deals with Butenandt's work with Kühn. Amazingly, despite their collaboration, they did not publish a single paper together. Butenandt published his research with his postdocs, but never with equal partners — he wanted all the glory for himself.

Carola Sachse writes about Butenandt's friendship with von Verschuer. And Trunk provides a new suggestion about experiments that von Verschuer considered doing with the blood samples from Auschwitz. Trunk's proposition that von Verschuer was hoping to develop blood tests to identify different races, if true, makes his work even more sinister than was previously thought.

I think that a 450-page book about a great scientist should have at least one chapter dealing with his discoveries. What did he discover and when? Who with? What did he miss? There are a few answers here and there, but a single chapter would in my view have been a useful addition. Historians who believe that the content of science is a social construct may not mind, but scientists will.

I applaud the publication of this book, but am disappointed that it has been published only in German. Should the international community be denied the tale of this sad piece of history? ■

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precision instrument-building led to the manufacture of good seismographs. New Madrid had little, if anything, to do with these developments. *The Big One* is a sloppy book, based on an erroneous premise. ■

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Population biology on the wing

On the Wings of Checkerspots: A Model System for Population Biology
edited by Paul R. Ehrlich & Ilkka Hanski
Oxford University Press: 2004. 371 pp. $64.50, £40

Norman Myers

L. VINCENT/ALAMY

Spotting a pattern: checkerspot butterflies can help us to understand other invertebrate populations.

Extinction is the single irreversible feature that lies at the heart of the biotic crisis overtaking the planet. But it is not the extinction of species that counts most, even though we are in the opening phase of a species extinction spasm to surpass anything since the demise of the dinosaurs and associated species 65 million years ago. More significant even than the loss of species is the extinction of populations — the discrete aggregations of individual organisms that make up species. It is populations that form the basis for the diversity and abundance of species overall. A few species comprise just one population, but most have hundreds. Worldwide there are, crudely reckoned across all species, between 1.1 billion and 6.6 billion populations. We are consigning populations to eventual extinction at a rate many times higher than that for species. This is the hidden extinction crisis, overlooked by the public and our political leaders — and it receives much less attention than it might from many biologists.

Populations also provide the ecosystem goods and services that support human economies and societies. For instance, winged insects such as butterflies and bees serve as pollinators, and disrupting this role can cause long-term cascading effects throughout ecosystems. The mass extinction of populations is propelling us into a grossly destabilized environmental future.

Because biologists can study only a very small proportion of all species and an even smaller proportion of their populations, there is a premium on identifying a few long-term field studies of populations that can shed light on key questions of evolutionary biology. Such studies have examined Galapagos finches, Gombe chimpanzees, mountain gorillas and Serengeti lions. Regrettably, there had been no such study for invertebrates until the two editors of this book, Paul Ehrlich and Ilkka Hanski, started studying populations of one of the better-known categories of butterfly, the checkerspots, in central California and southern Finland.

There are at least 20,000 known butterfly species in the world, but the checkerspots make up fewer than 400 of them, and a good many of these are endangered. They are among the best-studied populations of all invertebrates, and so are crucial for our understanding of the millions of invertebrates that make up the vast majority of all species. The two editors and 13 contributing researchers have sought to use their 40-plus years of intensive field and laboratory study "to create one population biological analogue to the well-known model systems in other biological disciplines, such as the fruitflies of classical genetics". The result is a collaborative overview of model systems in population studies.

The book reviews a spectrum of the basic biology of checkerspots, including reproductive and larval biology, feeding patterns, population structure and dynamics, ecology and taxonomy. There are extended discussions of such issues as dispersal and migration, colonization, inbreeding depression, predation and parasitism, genetic differentiation, habitat fragmentation, threshold disturbances (especially by humans), climate and conservation biology. To cite the editors' ultimate purpose, the major intellectual challenge of population biology "is understanding the functioning of natural populations — how they are distributed and structured, how and why their sizes change, and how they evolve". In many respects, the book offers basic insights into the ecological and evolutionary dynamics of insect populations generally, not just of checkerspots, and thus forms a classic of modern biology.

The book provides lots of lessons for conservation biology. Many butterflies occupy successional habitats, which are in transition from one ecological state to another. So studying their populations indicates how far they can adapt their lifestyles to human-disturbed landscapes. Like many butterfly species, checkerspots favour open country. Humans have been a potent force in converting forests into open landscapes, but regrettably many of these are pesticide-doused farmlands, overgrazed pastures, golf courses and treeless subdivisions — far from suitable habitats for butterflies.

Butterflies are a staple of summer gardens, parks and other landscapes. Yet about one-fifth of European butterfly species are threatened or vulnerable, and roughly one-seventh of those in the United States and Canada are at risk in certain areas or in the whole of their ranges. The path towards extinction can be rapid. The large blue butterfly (*Maculinea arion*) in Britain declined from some 30 populations with an estimated 100,000 individuals in the mid-1950s to just a single population of only 250 adults in the early 1970s, and to final extinction in 1979. Conversely, several UK butterfly species have expanded their ranges in recent years, ostensibly in response to global warming.

In the main, however, the prospect for many butterflies is not propitious. This book offers many clues on how we can improve that prospect. ■

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Correction

In Benno Müller-Hill's review of the book on Adolf Butenandt (*Nature* **431,** 246; 2004), it was wrongly claimed that Otmar von Verschuer told colleagues in 1946 of his and Gunter Hillman's involvement in the analysis of blood samples from Auschwitz. In fact, von Verschuer disclosed this information in a written report to the DFG in 1944.