that young children will fall in the water. Only concrete structures with deep pilings stand much chance against floods—and they are prohibitively expensive, in part because they do not use building materials to hand in the delta.

It is better to site settlements on raised plinths of densely compacted alluvial earth. Some aid organisations have encouraged the construction of settlements in a long, thin line parallel to the flow of the river. The current can flow from unpredictable directions, however, and quickly punch a hole in the berm's side. A blocky, square-shaped plinth is vulnerable, as the waters hit these with irresistible force. The block's uncompromising shape creates eddies on the downstream side that can also eat away at the back of the structure.

Friendship, a non-profit organisation, takes a more intuitive approach, one that was inspired by a seaplane trip to the remoter *chars* by the company's founder, Runa Khan, and Kashef Mahboob Chowdhury, an architect. Mr Chowdhury, who won the prestigious RIBA International Prize in 2021, has said he was struck by the current-formed contours of the *chars* themselves. Looking at them from above, he could see "they had comet shapes, and left a trail." The best design, he deduced, would be "a teardrop-shaped island which has a rounded elliptical front". This layout would allow water to pass by quickly with minimal damage to the island.

Mr Chowdhury's plinth design is a boat-like form about three metres high, 113 metres long and 73 metres wide (see picture). Villagers' huts line the rim. Since flood water is not safe to drink, in the centre of the plinth village is a hole for rainwater; in the dry season when the pond is low, planted gourds and squash clamber up the sides. Latrines are situated away from the settlement. It is a simple design of genius.

Two-dozen such plinth villages have now been built in the *char* districts, each costing about $50,000. The waters took two early examples, but the others flourish. The most impoverished families get first dibs to live on the plinths. When the waters rise, outlying families come up with their livestock to join them.

At a plinth village surrounded by fields of sweetcorn a few kilometres upstream from Gaibandha, Sadaf shares a bamboo-and-corrugated-iron home with her mother, four-year-old daughter, a cow and four goats. After being forced by the waters to move a dozen times over the years, she says, they have a degree of security they have never enjoyed before.

Often security is ensured, strangely, by mobility. It is no good growing vegetables on a *char* if you do not have the means to take them to market. When Friendship was set up two decades ago, Ms Khan says, its first step was often to help *char* villages get a boat. Denied one, growers have to wait for others to come to them to buy their produce—and accept unfavourable prices. A small, lean boat cleaving the current leaves as light a footprint as it is possible to imagine. It is often the first obvious structure to benefit impoverished *char* communities, especially if built by locals in Bangladesh's "country boat" tradition.

Other, less traditional, vessels followed. Three hours' chug upstream, moored to the opposite bank, looms one of Friendship's two hospital ships, converted with Mr Chowdhury's involvement from a flat-bottomed steel barge. Many *char* communities are cut off even from primary health care, so the hospital comes to them.

It moves up and down the rivers on an advertised schedule, staying at each spot for weeks. Corrugated-iron shelters are set up on land for patients awaiting treatment, or recuperating after it. Each year the ships' 72 doctors, nurses and pharmacists treat 105,000 patients: they deal with everything from skin infections to cooking-fire burns, and also administer vaccines.

The concept has been extended by other non-profit organisations to floating schools: glorious timber-and-bamboo arks bringing the classroom to schoolchildren when, floodbound, the youngsters cannot get to the classroom. For generations, *char*-dwellers have learned to cope in a land that gives and ruthlessly takes away. Design innovations and adaptations may help them thrive for generations more. ■

Epidemiology

Bugs in the system

A new history of humanity puts germs at the centre

Pathogenesis. By Jonathan Kennedy. *Crown; 304 pages; $30. Torva; £25*

For the first 250,000 years after *Homo sapiens* evolved, they existed on Earth alongside several other species of human in Africa, Asia and Europe. Around 50,000 years ago, however, *H. sapiens* left Africa and migrated across the world; around the same time, all the other species began to disappear. The fossil record shows that the last Neanderthals died out roughly 39,000 years ago, leaving only *H. sapiens*.

Why the other humans perished may be the biggest conundrum of the early Palaeolithic age. The prevailing explanation is that *H. sapiens* was more intelligent. In his book "Sapiens", Yuval Noah Harari, a historian, argued that the species went through a kind of "cognitive revolution" between 70,000 and 30,000 years ago, probably after a genetic mutation transformed how they thought. Since *H. sapiens* was brainier than other species, these humans had better communication skills and, presumably, better fighting ability.

A plague in all their houses

According to Jonathan Kennedy, the author of "Pathogenesis", there is a better explanation for why *H. sapiens* prevailed: their immune systems were superior. As their populations boomed, genetic diversity increased and, since they lived in Africa, much closer to the equator than other humans, *H. sapiens* would have been exposed to a greater array of animals carrying a variety of microbes. Some of those microbes would have been pathogenic. (Indeed, the majority of bugs that infect humans are zoonotic—ie, they jump the species barrier from other animals.)

As *H. sapiens* moved across the world, they would have been protected against the diseases carried by the other humans they met. The converse was not true, however, meaning Neanderthals and other humans were less resistant to the diseases carried by *H. sapiens*.

From there, Mr Kennedy goes on to rewrite much of the history of life, with microbes at the forefront. "It's a bacterial world", he writes, "and we're just squatting here." Infections have shaped fundamental elements of mammalian biology, for example. When animals first evolved, they

laid eggs in order to reproduce. But a few hundred million years ago, a shrew-like creature developed the ability to grow young inside her body. Geneticists argue that this ability did not evolve naturally, but was suddenly acquired when a virus inserted its DNA into the creature's genome. Without that infection, humans might be hatching from eggs today.

Human civilisations have been shaped by disease, too. Multiple plagues afflicted ancient Romans and Mr Kennedy argues that the death and devastation not only led to the collapse of that empire, it also set in motion the societal changes that allowed Christianity to dominate the world.

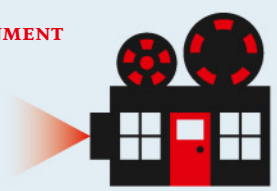
Some of his most striking stories come from the Spanish conquest of the Americas. The prevailing story here is that the Europeans had better technology and weapons with which to subdue the less advanced societies in the Americas. That's not entirely true, Mr Kennedy says.

The introduction of infectious diseases from Europe, he writes, resulted in a 90% fall in the population in the Americas, from about 60.5m in 1500 to 6m a century later. If Europeans brought disease to those in the Americas, why didn't American pathogens have a similar effect on the invaders? Many of the diseases Europeans had immunity to had originated in domesticated herd animals such as cows, pigs and sheep. In the Americas, people had also domesticated animals—alpacas, guinea pigs and llamas—but "unlike the ancestors of Eurasian farm animals, alpacas and llamas hadn't lived in vast herds prior to domestication, limiting the opportunities for diseases to emerge and become endemic." People in the Americas would not have been exposed to as many microbes from their farmed animals.

There is a hint of formula about this book: as soon as a new set of characters is introduced, you know infection looms. But that is a minor quibble in a compelling account of the role of bacteria and viruses in world history. Mr Kennedy marshals a dizzying range of material, from the transition from feudalism to capitalism in Europe to the rise of the slave trade to the defeat of the British army by American revolutionaries in Yorktown in 1781.

It helps that Mr Kennedy's epidemiological writing is leavened with pop-culture references: "The Lord of the Rings", "2001: A Space Odyssey" and Monty Python provide on-ramps for some of the complex tales Mr Kennedy tells. Despite the sweeping ideas, therefore, his book is an entertaining read. "Emphasising the role that infectious diseases play doesn't exclude the possibility that humans can have an impact on the world," he concludes. "It's just that very often we don't make history in circumstances of our own choosing, but in circumstances created by microbes." ■

HOME
ENTERTAINMENT



Stars of the stage and screen

Prima donna

Sarah Bernhardt, who died 100 years ago, was the first modern celebrity

"THERE ARE five kinds of actresses," Mark Twain once wrote. "Bad actresses, fair actresses, good actresses, great actresses—and then there is Sarah Bernhardt." No one was, or ever had been, quite like her. The French performer was celebrated not only for her enchanting voice, but also as "the queen of the pose and the princess of the gesture". She played the greatest roles written by Dumas, Molière and Shakespeare and is thought to have inspired the character of La Berma in Proust's "In Search of Lost Time". A new exhibition in Paris, "And the woman created the star", marks the centenary of Bernhardt's death in March 1923.

Bernhardt had been acting from a young age, but did not break out until her late 20s, when she played Phèdre in Racine's tragedy at the Comédie-Française. The theatre company was prestigious, yet soon it was Bernhardt the public was flocking to see. After a successful tour of Britain she cut them loose and embarked on the first of several lucrative tours of America. She travelled in a manner appropriate to a modern-day diva, making use of a personal train carriage which carried her maid, cook and leading man.

The public was as enraptured by her unconventional private life as it was by her skill on the stage. Bernhardt was unapologetically, and publicly, promiscuous. It is thought her lovers included Victor Hugo—when she was 27 and he 70—Gustave Doré and the Prince of Wales, as well as a number of her fellow actors. She proudly raised her son, whom she claimed was fathered by a Belgian aristocrat, as a single mother.

She owned a vast menagerie of exotic animals which included a cheetah and an alligator, and kept a satin-lined coffin in her bedroom in which she sometimes slept. It was Bernhardt herself who provided the press with a photograph of the coffin, for she understood the importance of self-mythologising. She cannily took advantage of the latest technology to disseminate her image around the world.

She was photographed by Félix Nadar, considered the first celebrity photographer, and employed Alphonse Mucha, an artist, to create posters of her using the new technique of lithography. Her name was used to sell everything from Pears Soap to Columbia bicycles. A short documentary made by France Culture, available on YouTube, argues that Bernhardt should be considered the first influencer.

Unsurprisingly, she was drawn to the medium of film when it emerged. In 1900 a short recording was made of her turn as Hamlet, in which she can be seen duelling with Laertes. She starred as Queen Elizabeth I in a hit silent film of 1912, and it made her the first international movie star at the age of 68. A few years later she was the subject of one of the earliest "celebrity at home" documentaries.

When Bernhardt died in 1923, at the age of 79, hundreds of thousands of people lined the streets of Paris as her coffin was transported to Père Lachaise cemetery. The monument was engraved only with her name. Nothing else was needed. The world knew who she was. ■