Later research revealed that ASFV likely arose in eastern and southern Africa and subsequently spread throughout much of Sub-Saharan Africa. It has diversified into at least 24 different genotypes, each of which can encompass many different strains. In eastern and southern Africa, ticks of the Ornithodoros genus transmit the virus between common warthogs (Phacochoerus africanus) and domestic swine. ASFV infections in African wild species are typically benign, suggesting they’ve coevolved with the virus for a long time, but in domestic pigs, infection unleashes chaos in the animals’ immune systems. Upon infecting macrophages and other white blood cells, many ASFV strains proliferate rapidly and trigger inflammatory reactions while simultaneously degrading proteins that blunt the animals’ immune response. Infection also induces cell death in white blood cells and endothelial cells lining blood vessels. Ultimately, infected pigs develop hemorrhagic shock and die. For farmers in many parts of Africa, “it is devastating,” says Mary-Louise Penrith, a veterinary pathologist at the University of Pretoria in South Africa.

For most of its evolutionary history, ASFV has been limited to its continent of origin. Before the current outbreak in Asia, the virus was known to have journeyed out of Africa only twice: in 1957, when an ASFV genotype 1 strain infected Portuguese pigs that ate food waste from airline flights traveling from Africa to Lisbon, Portugal. The ensuing outbreak of the disease was quickly eradicated. Later research revealed that ASFV transmitted via food waste from airline flights traveling from Africa to Lisbon, Portugal. The ensuing outbreak of the disease was quickly eradicated. In as little as five years, it swept through the Caucasus and into Russia—a “game-changing moment” for ASFV and the world, says Rock.

That this strain eventually surfaced in China in 2018 was not a surprise to anyone in the field. “There’s so many pigs in China, it was just a matter of time,” veterinary epidemiologist Dirk Pfeiffer of City University of Hong Kong told The Scientist last year. By the summer of 2019, the epidemic had escalated into what Pfeiffer calls the “biggest animal disease outbreak ever.” Some feared that it would further escalate into a worldwide pandemic. In response, the field has seen an influx of funding from the European Union, Bulgaria, and China, with governments funding researchers in the hope that they develop a vaccine quickly.

But that’s easier said than done, notes Luis Rodriguez, a virologist at the United States Department of Agriculture’s (USDA) Plum Island Animal Disease Center, which relaunched a long-inactive ASFV program the year after the virus’s spread to Europe in 2007. “We’re doing the best to move forward as fast as we can in developing these vaccines, but that is a process that takes time and effort, and there are major challenges.”

**Live vaccines**

As early as 1967, researchers discovered that the traditional approach to making vaccines didn’t work for ASFV. Pigs injected with killed or inactivated forms of the virus—intended to provoke their B cells into generating virus-targeting antibodies—weren’t protected against virulent forms of the disease. In 2014, a team of German scientists tried the experiment for themselves, and found that while pigs did develop antibodies against ASFV proteins, it wasn’t enough to protect them from infection. Since the late 2000s, ASFV is thought to have gained a foothold in Europe, especially the eastern part of the continent where infections often spill over to small-scale pig farms. It’s not yet clear whether ASFV has infected wild boar populations in China or other East Asian countries it has spread to. If it has, the virus will be near-impossible to eradicate there.

**ASV’s Deadly Escapes from Africa**

For centuries, African swine fever virus (ASFV) has circulated between ticks and warthogs in Africa as part of a natural lifecycle, occasionally spilling over to domestic pigs. (See graphic on opposite page.) The virus became a global concern when it left the continent and spread to the Iberian Peninsula—twice in the mid-20th century. The second time, it traveled across the Atlantic to Brazil and then crossed the Atlantic to Brazil and spread to the Caribbean islands. It’s not clear yet where the virus eventually spread to, but it is still causing hundreds of outbreaks each year after the virus’s spread to Europe in 2007. “We’re doing the best to move forward as fast as we can in developing these vaccines, but that is a process that takes time and effort, and there are major challenges.”

**ASV’s Lifecycle**

ASFV is transmitted by ticks of the genus Ornithodoros to common warthogs (Phacochoerus africanus spp.) when they feed on the wild animals’ blood. Domestic pigs (Sus scrofa domesticus) can catch the virus through tick bites in areas of Africa where warthogs exist, as well as through contact with contaminated food or materials. In Eastern Europe, where the disease is also endemic, pigs can contract ASFV by coming into contact with bodily fluids or carcasses of infected wild boar (also Sus scrofa).

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**Where is ASFV Endemic?**

ASFV is endemic in eastern and southern Africa, where it has been circulating among wild warthogs for hundreds of years, and also in West Africa where it is routinely spread among domestic pig populations. Following its emergence in Georgia in 2007, the virus also became endemic in Eastern Europe. It’s not clear yet whether wild swine populations in Asia have begun transmitting ASFV to domestic pigs.

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ASFV traveled out of Africa for the first time, likely via food waste from airline flights traveling from Africa to Lisbon, Portugal. The ensuing outbreak of the disease was quickly eradicated. In as little as five years, it swept through the Caucasus and into Russia—a “game-changing moment” for ASFV and the world, says Rock.

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