Evolution of the appendix: A biological 'remnant' no more

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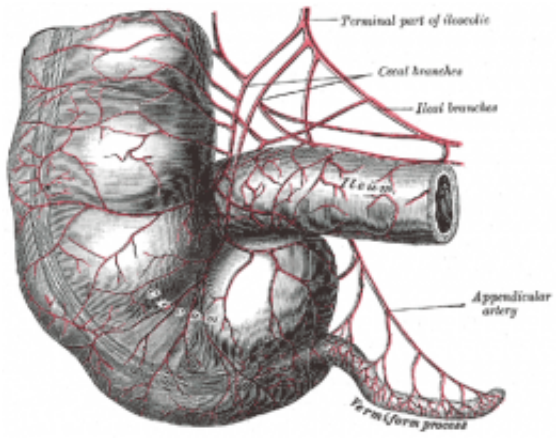

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The lowly appendix, long-regarded as a useless evolutionary artifact, won newfound respect two years ago when researchers at Duke University Medical Center proposed that it actually serves a critical function. The appendix, they said, is a safe haven where good bacteria could hang out until they were needed to repopulate the gut after a nasty case of diarrhea, for example.

Now, some of those same researchers are back, reporting on the first-ever study of the appendix through the ages. Writing in the Journal of Evolutionary Biology, Duke scientists and collaborators from the University of Arizona and Arizona State University conclude that

Charles Darwin was wrong: The appendix is a whole lot more than an evolutionary remnant. Not only does it appear in nature much more frequently than previously acknowledged, but it has been around much longer than anyone had suspected.

"Maybe it's time to correct the textbooks," says William Parker, Ph.D., assistant professor of surgical sciences at Duke and the senior author of the study. "Many biology texts today still refer to the appendix as a 'vestigial organ.'"

Using a modern approach to evolutionary biology called cladistics, which utilizes genetic information in combination with a variety of other data to evaluate biological relationships that emerge over the ages, Parker and colleagues found that the appendix has evolved at least twice, once among Australian marsupials and another time among rats, lemmings and other rodents, selected primates and humans. "We also figure that the appendix has been around for at least 80 million years, much longer than we would estimate if Darwin's ideas about the appendix were correct."

Darwin theorized that the appendix in humans and other primates was the evolutionary remains of a larger structure, called a cecum, which was used by now- extinct ancestors for digesting food. The latest study demonstrates two major problems with that idea. First, several living species, including certain lemurs, several rodents and a type of flying squirrel, still have an appendix attached to a large cecum which is used in digestion. Second, Parker says the appendix is actually quite widespread in nature. "For example, when species are divided into groups called 'families', we find that more than 70 percent of all primate and rodent groups contain species with an appendix." Darwin had thought that appendices appeared in only a small handful of animals.

"Darwin simply didn't have access to the information we have," explains

Parker. "If Darwin had been aware of the species that have an appendix attached to a large cecum, and if he had known about the widespread nature of the appendix, he probably would not have thought of the appendix as a vestige of evolution."

He also was not aware that appendicitis, or inflammation of the appendix, is not due to a faulty appendix, but rather due to cultural changes associated with industrialized society and improved sanitation. "Those changes left our immune systems with too little work and too much time their hands - a recipe for trouble," says Parker.

That notion wasn't proposed until the early 1900's, and "we didn't really have a good understanding of that principle until the mid 1980's," Parker said. "Even more importantly, Darwin had no way of knowing that the function of the appendix could be rendered obsolete by cultural changes that included widespread use of sewer systems and clean drinking water."

Parker says now that we understand the normal function of the appendix, a critical question to ask is whether we can do anything to prevent appendicitis. He thinks the answer may lie in devising ways to challenge our immune systems today in much the same manner that they were challenged back in the Stone Age. "If modern medicine could figure out a way to do that, we would see far fewer cases of allergies, autoimmune disease, and appendicitis."

Source: Duke University Medical Center (news : web)