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In 1889, the St. George's Hotel, where the X Club held several of their meetings, was merged with the neighbouring Brown's Hotel on Albemarle Street. The luxury hotel in Mayfair was the location of the first successful telephone call in Europe in 1877.

Whales have tiny non-functional hind legs. They are only recognisable as such in the skeletal structure and manifest as small fins where the legs would have grown. Despite being a waste of energy, building these tiny legs is not harmful to the organism as a whole. Moles have blind eyes. They are mere rudimentary eye-like spots where the eyes would have developed. While these eyes are unable to see, they can still get infected and can therefore be a threat to the organism. And still the construction plan for these non-functional body parts is in the mole's DNA. The whale's ancestors must have been terrestrial animals before they moved back into the water permanently and lost the purpose for legs altogether. The moles must have once spent more time above ground before their bodies adapted to life underground. While structures that are not harmful will take longer to re-form than ones that are, adaption and evolution are incredibly slow processes. Attributes or structures like the whale's tiny hind legs and the mole's blind eyes that have lost their ancestral function are only two examples out of many. Others exist in many species, including humans. These rudimentary structures are called vestigial organs.

Vestigial organs in animals are examples of constant change in nature. What vestigial organs are there in our society? And what do they mean for society's evolution?

By indicating that changes occurred in the past, the whale's hind legs and the mole's eyes also point inherently towards change in the future; rudimentary organs, by their very existence, imply the potential for modification. Just as nature keeps evolving, so does our understanding of what nature is and how it is intertwined with our lives. Despite the feasibility of understanding certain natural processes and correlations factually, priorities and perspectives will evolve. For instance, the human-made and natural causes of climate change, as well as the knowledge about those processes, have not drastically changed over the last decades, but the urgency surrounding that knowledge has increased and will further increase in the future. Circumstances affect research priorities. While experiencing more and more visible changes like extreme weather conditions, the urgency with which we research climate change will also increase. Viruses, vaccines, pandemics and the knowledge we have about them has not necessarily changed, but the urgency with which that information is addressed might be different after this year.



In an ongoing evolutionary process, nature is changing, shifting, evolving, alternating, modifying as much as the human perception of what nature is and does. Vestigial organs are visible leftovers and living proof of this variability and unfinished biogenesis. Therefore, those body parts stuck in the past are evidence for Charles Darwin's theory of the evolution of species over time through natural selection, first published in *On the Origin of Species* in 1859. During Darwin's lifetime in 19<sup>th</sup> century Victorian England—a society characterised by Christianity and clerical power structures—his ideas were not well-received. If it was not for the firm support of a sympathetic group of fellow scientists, centred around Thomas Henry Huxley, who endorsed his theory, the ruling Christian interpretation of a God-created world may never have been challenged.

Darwin's supporters included nine men who called themselves the X Club. They were George Busk, Edward Frankland, Thomas Archer Hirst, Joseph Dalton Hooker, Thomas Henry Huxley, John Lubbock, Herbert Spencer, William Spottiswoode and John Tyndall. The name X Club was chosen because it committed the nine men to nothing. Alternatively, they almost called themselves The Blastodermic Club. The blastoderm is a layer of cells in the ovum of birds determining the entire development of the bird. Maybe their affinity for the blastoderm correlates with the speed at which research seemed to move forward in their time, as well as their own social position which allowed them to be at the centre of the development of new science. Starting off as an effort to keep nine friends from drifting apart by committing to monthly dinner meetings, the club quickly developed into an elitist group of intellectuals who monopolised scientific thinking. Its members made sure to dissociate from other (mostly men's) scientific clubs of the time, like the Philosophical Club, the Red Lion Club and the B-Club, none of which were sufficiently intimate or professional for members of the X Club. Meetings—usually held over dinner, allowing for casual conversation as well as the discussion of new developments in science and politics—took place in different locations in London's Mayfair area, like the St. George's Hotel on Albemarle Street, Almond's Hotel on Clifford Street, and the Athenaeum Club. The latter was established in 1824 as a gentlemen's club, and persists today as a private members' club for men and women with intellectual interests. Women were only allowed

to become members as of 2002. To this day, Mayfair remains a prestigious area with hotels, numerous luxury brand shops and said private club, all attesting to an unchanging desire for exclusivity in lifestyle and access to culture and science.

Despite being critical of their religious society and positioning themselves as outsiders, those in the X Club were at the social centre and worked to change the scientific community from within their own positions of power. By handing highly influential roles to one another—for example, as lecturers of elite universities or chairman of the Royal Society—and supporting each other's research, they ended up majorly influencing the course of 19th century natural science.

Among their main beliefs was the belief in science and knowledge itself: that nature and the natural order are determined by a series of causes and effects and can therefore be explored and explained with scientific methods. Everything beyond this way of thinking is beyond science—and therefore, for them, beyond knowledge itself. At the time, this reductive way of defining nature allowed for rational scientific thinking clearly distinguished from a religious or mystic world view.

From this rational but constricted perspective, nature seems to be quite static. It would be knowable and perfectly researchable. It could be viewed as a very slow creature letting us generously look at it, investigate its bumpy skin and maybe even draw a little blood.

But the creature moves and does not hold still. It crawls, it stretches its muddy limbs and sometimes it shakes off a little bug. Whenever the creature twists and turns, maybe the earth's temperature goes up or down just a little. Whenever the creature wiggles, a species evolves or a species goes extinct. The creature operates on a different time scale. Its movements may be beyond knowledge and therefore beyond science. But if we poke the creature, if we draw blood and investigate its bumpy skin, it will wiggle and twist, it will stretch and shake.

The exclusive nature of X Club meetings not only meant that nobody else had access to their version of nature, but that they insulated themselves from differing views. In this case, exclusivity meant that the nine men could think freely from ideological restrictions, but at the same time, it narrowed their angle on natural science.

Despite an apparent objectivity when it comes to natural science, attempts to define what nature is and to understand how the natural world is interconnected are always linked to social



The Athenaeum Club on the corner of Pall Mall and Waterloo Place is a private member's club founded in 1824. Women were only allowed to join as members beginning in 2002.

circumstances; ideologies and established belief systems restrict and define the research being done. According to recent European history, the X Club is a group who pushed for scientific thinking against established ideas and norms, all the while creating restrictions of their own, which ended up limiting who was permitted to think about science—and, concurrently, how they thought about it. If research and specifically natural sciences were actually objective and equally accessible, how would we look differently upon nature and the world we live in today? And in what ways would that change our actions? Today more than ever it is hard to access or define what objective truth is. With social media as a bottomless pit of information and disinformation, one's social circle determines which news and articles will show up on the major online platforms and which will not.

Returning to social circumstances influencing research, the predominantly male scientific community has for a long time disregarded the role of female selection in sexual reproduction. Before Darwin's evolutionary theory, a prevalent opinion about reproductive selection was that the males of a species simply fought over access to the females; only the strongest of them got to reproduce. The flaw in that theory is the lack of female selection, which was not taken into account. This was due to a biased research culture, which disregarded the female reproductive organs. It is not only easier to observe external sexual organs—penises—than internal sexual organs—vaginas—but scientific research has traditionally been a male-dominated field. Regardless, female selection in fact happens through behaviour as well as organ structure: some female birds choose their mate based on the male's impressive plumage or their mating dance skills. Females of certain whale species have large, convoluted, labyrinthine vaginas, selecting for the strongest sperm to reach the ovum. Again, none of these natural processes has changed drastically in recent evolutionary history, but the social circumstances and urgency under which they have been researched has changed, allowing for different perspectives and discoveries, like the influence of female selection on evolution.

Another crucial example of how social circumstances restrict scientific thinking can be found in the male dominated medical and pharmaceutical sciences. For centuries, the female body was thought of as a weaker version of a male body; a male body lacking something. The only visible difference was thought to be the reproductive organs and the ability to bear children. Therefore a woman's body was reduced to the function of her womb.





In 1845 William Almond acquired the house on Clifford Street no. 7 to turn it into Almond's Hotel and later merged it with Clifford Street no. 6 to expand the hotel. Almond's Hotel remained open until the war (1939 – 45) and was demolished in 1962. Today, Clifford Street no. 7 is a residential building.

Historically, if the latest medical treatments could not bring relief, all health problems were quickly associated either with the absence of a pregnancy or with some form of hysteria, implying that women did not have the mental strength to cure the problem in their bodies. The assumption of female bodies basically being male bodies without a penis stretches into modern medicine as well. Until 1993, women were excluded from participating in clinical trials for new drugs. The reasoning behind this restriction, established again by a largely male dominated professional field, was that the child-bearing potential of participating women might be harmed or that there might be danger for foetuses, regardless of the women's sexual orientation or desire to have children in the first place. As a result, women are, up to today, exposed to a range of drugs that have not been tested on female bodies. Those drugs might have a different potency or varying side effects for women compared to the male bodies that they have been tested on and therefore designed for. Despite the suspension of the restriction banning women from participating in clinical trials altogether in 1993, women today are still dangerously underrepresented.

If women had been equally involved in science and research since its origins, we may well be living in a different world today. We might have different scientific knowledge, if only by virtue of having allowed a greater variety of perspectives. This does not only concern female health but expands to environmental questions. For instance, had the topic of sexual female selection in animals been taken into account earlier, we would know more about the reproductive habits of various species.

In the examples above, a social structure—like a mostly male research community—means an inherently restricted perspective. The X Club was an extremely exclusive group, dominated not just by men, but men who were economically privileged members of the upper class. Due to these circumstances, the X Club was able to challenge and overcome certain obsolete and outdated ways

of thinking, like the religious ideology that could have prevented Darwin's theory of evolution from gaining ground. On the other hand, the gender and socio-economic exclusivity of the X Club prevented certain types of knowledge from being explored in the first place. Therefore, an exclusive scientific research community, a hypothetical X Club, is itself a vestigial social structure, a rudimentary organ. Once useful, it is now not only needless but, in some circumstances, even hindering. The whale's hind legs are admittedly not very useful but are also not disruptive to the whole organism. However, if the mole's blind eyes get infected, the vestigial structure threatens the health of the organism as a whole. Thinking of exclusivity, in both scientific and social contexts, as a vestigial structure means asking if these structures are hind legs or blind eyes. If it turns out that we are the mole and the vestigial structure is our eyes, it also means asking if we can actively overcome the harmful vestigial structure so we don't exclude other, enriching perspectives. In ever-changing circumstances, we have to adapt constantly as a society and be careful not to carry too many infected eyes into the future. A vestigial structure signifies a change in the past, and therefore, by extension, the possibility for change in the future.

If cultural and social circumstances under which knowledge is developed determine the outcome and direction of said research, it is necessary to ask which kind of society we should aspire to establish. How can the process of research be open, inclusive and accessible? In order to live in a culture that allows for truly free thinking, the very process of collective thinking must be unconditionally accessible. Not only does that mean working towards equal participation in research and education in terms of gender, but also in terms of social class and cultural background. We must make room for the variety of voices and perspectives that will allow us to gain a fuller and more complete understanding of what nature is, how the creature wiggles and twists, and how that will affect us.