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Saudações (greetings)

We are social animals. We meet and greet, and in doing so we use words or short phrases to verbally close the social distance. These are often the first words we use when travelling in distant places and meeting their inhabitants. They are the words we learn first when preparing to visit foreign lands. They also form the basis of our very first introduction, as adults, to another language. So, as we prepare to cross the frontier into a new world, it would be perfectly logical to make a start on the language we're going to use there by learning a few words of greeting. They're likely to be the equivalent of "Hello! Pleased to meet you. I'm XYZ. What's your name?"

You make need a few simple imperatives or command words such as "Look!" or "Listen!" so that your fellow travellers can share moments of recognition. Discoveries are not meant to be solitary experience. Communicating your expedition experience is one of the joys of travel and possibly your best way to get the show back on the road at a later date.

The first person to encounter microbes was almost certainly Antonie van Leeuwenhoek, working with the earliest microscope around 350 years ago. He was a self-educated draper who used homemade magnifying glasses to inspect the cloth he bought and sold. Using a process he never fully disclosed, he made lenses of progressively higher magnification until he was able to see single cells suspended in liquid. A man who had serious problems with the idea of spontaneous generation, van Leeuwenhoek used his microscopes to study the biology of

reproduction and cellular generation. His findings were written up in his native Dutch and submitted to the Royal Society for verification by a sceptical scientific community. Gradually his ideas gained credence and wide recognition during his lifetime. His discoveries now stand alongside those of Isaac Newton and Robert Boyle as critical contributions to scientific knowledge. But before we get sucked into the universe under the microscope, we need to spare a thought for what van Leeuwenhoek's first impressions were and how he communicated them to his own household. Coming from a thoroughly Dutch Reformed tradition, it is unlikely he used any expletives, no matter how stunning his first sight of minute life might have been. As the first realisation of what he had seen dawned on him, the words are most likely to have been short, and quite probably commands: Hey! Look at this! Come and see what I've found!" or something similar. With a bit of repetition - and we know he spent a lot of time repeating experiments - he will have recognised patterns. He certainly saw movement among his "animalcules' or little animals. We now think from his drawings that these included various unicellular organisms such as protozoa and rotifers. He studied plant cells and spermatozoa, in his research into cellular generation. Though his work in a field we might want to call cell biology opened a window on what he called "wretched beasties", it appears that he got no further than "Hello! Pleased to meet you. What's your name?" and did not establish a formal nomenclature or functional analysis. These developments had to wait for others to catch up with van Leeuwenhoek and place his discoveries in context, a process that took the best part of two centuries.

There will be time to dwell on the discoveries of that period and their aftermath in later chapters. But for now, let's fast-forward around three centuries and get into the modern era. Well almost. Around my tenth birthday my father dusted off my great grandfather's brass monocular microscope and set it up by a desk lamp so that I could have a look at the contents of the garden pond. It was my first introduction to life on such a small scale. I don't remember how long it took to get my eye in, or how long I spent gazing at the new world in front of me. But what I can still sense is that first flush of discovery; a sense of privilege that returns each time I go diving under a glass coverslip. "Hello, pleased to meet you! What's your name?" There were plenty of other questions. Unfortunately, the answers did not come easily in that pre-electronic era. It had to plod through years of secondary and tertiary education before I learned the fundamentals of biological nomenclature, methods of functional analysis and systems of causality. The highlights of that process have let to immersion in the problem of generalised bloodstream infection, tropical diseases, biosecurity and even climate change.

Fast forward again, from the 1960s to the 1980s and we come face to face with one of the most significant "Hello!" moments of the biomedical sciences, when a couple of American molecular biologists discovered the polymerase chain reaction (PCR). One of the earliest "Pleased to meet you" announcements about PCR was in the scientific journal Nature. There was a lot of excitement at the time. Some colleagues waxed lyrical about the possibilities, while others tried to pour cold water over the discovery. With all significant discoveries there will be early and late adopters. Now, another two decades on, we can form a

more mature opinion on how much difference the PCR has made. Maybe not as much as the light microscope, but it comes close. To be fair, there have been other critical developments in biomedical science that do a lot more than add a bit of context to cell biologists with fancy microscopes (they get fancier and more expensive with each new edition of the supplier's catalogue), or to molecular biologists with a beautiful, new thermocycler.

Those other developments in information technology, social and environmental sciences describe another border to the world under the coverslip. You see, public and environmental health utter their imperatives and start the greeting process as a result of a different kind of analytical process; one based on numbers of people, mathematically defined population events and measured risk. Their represents, perhaps, another dialect we need to be familiar with before claiming any degree of fluency in the language of infection. And though computers may be quite new in the overall history of medicine, the epidemiologists (originally named for people who study epidemic events) gained a march on pathologists, microbiologists let alone gene jockeys by describing how infectious diseases burned through populations. One of the more erudite moments of the Renaissance was when the early epidemiologist; Girolamo Frocastoro, penned his doctoral thesis on syphilis in verse. It makes the earliest scribblings on germ theory look stilted by comparison.

This almost rounds off our introduction to greetings in the three dialects of the language; the individual or clinico-pathological, the molecular, and the population-based. You find our lingua franca where these three dialects share common ground; the common language of infection on which we base our understanding of cause and effect at each successive, interconnected layer of organised. It sounds a bit difficult, as does any modern language does when you hear it in use for the first time. It has it own form, content, rules, principle and preferences. Yet it is a dynamic language, subject to further change with each new discovery. Biomedical scientists usually want to share the excitement of those discoveries with others, even if only to help the next grant application along. Most are delighted to share their news with the wider world and would do so more often if they didn't spend so much time locked away in the lab.

Yet among this cacophony of competing voices, we hear a faint murmur whose hum has something of all three dialects. You might hear it as the bass line underlying all other orchestral accompaniments; the drum roll that precedes any entry onto the microscope stage. This is an unrefined, indigenous knowledge of infection; why it happens, what to expect of it and what needs to be done with it. The superficial version of IKoI is what you learned from your mother before you first went to school. Mostly imperatives and short sayings, they include "You'll catch your death of cold",

"Feed a cold. Starve a fever', or "I'm under the weather." These things run ever so deeply, and are highly resistant to the conditioning effects of education. How else do you explain the current ingrained skepticism about the intent or efficacy of the "swine flu" - specific vaccine, and consequent low uptake. It's supposed to be a lifesaver, right?

As I draw to the end of this introductory chapter or chapter of introductions, I note that we've encountered some of the topics that we'll dwell on in more detail in following chapters: naming of microbes, their actions, reproduction, movement, purpose and intent. You may already have noticed the quirky appearance of words from another language at the start of this chapter. The route we will take follows a series of linguistic themes that are a little easier to comprehend if you are familiar with another spoken language. I have chosen one of the earliest modern languages to emerge in a stable modern form and therefore present throughout the scientific era. It has the added benefits of a foundation of Latin, in common with much of contemporary biomedical practice; and was also the common language of the earliest European explorers. Before English came to prominence; before the Dutch of van Leeuwenhoek, there was Portuguese. I will use it sparingly and for illustrative purposes only because the language at the heart of this account is, of course, the language of infection.

Tim Inglis, 26th January, 2010.