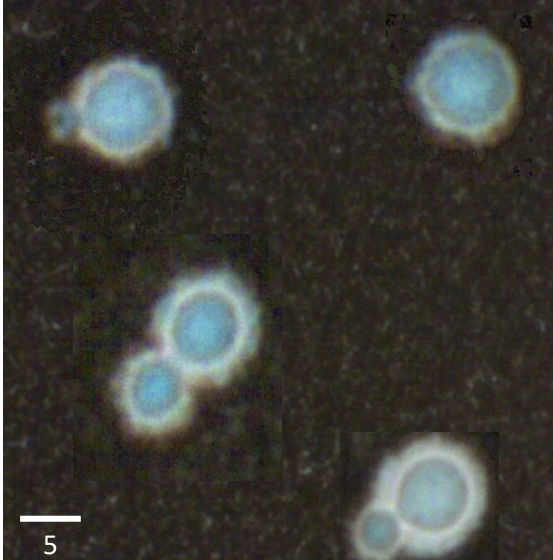


MicroRogue: The *Crypto* siblings
(*Cryptococcus neoformans* and *Cryptococcus gattii*)
(Kika Colom)



India ink negative stain of *Cryptococcus neoformans* cells producing polysaccharidic capsule. Optical microscopy. X100
Medical Mycology laboratory, UMH



Cryptococcus gattii melanization. Colonies growing on L-Dopa medium. Medical Mycology laboratory, UMH

Claim to fame: AIDS patients infections and life-threatening diseases.

In the 1980s, a terrible pandemic was unleashed by a previously unknown virus. It was named the Human Immunodeficiency Virus (HIV) because it mainly affected the cells of our most important defence system: the immune system. The disease caused by HIV was termed acquired immune deficiency syndrome, or AIDS for short.

Because of their sabotaged immune defences, patients infected by the virus were left unprotected against many micro-organisms that under normal conditions do not have the capacity to cause us problems. Thus, what made HIV infection such a serious disease was the defencelessness against other micro-organisms, called opportunistic pathogens, that are common in our environment and that thereby became able to cause so-called secondary infections.

As a consequence, severe infections of the nervous system, such as meningitis and encephalitis, began to be detected in HIV-infected patients. The micro-organism causing these infections was a yeast, called *Cryptococcus neoformans*, which is commonly found in the environment on nitrogen-rich substrates, such as the faeces of urban pigeons and other birds and the bark of trees, from which they can be inhaled. Many, many cases of cryptococcosis were described in AIDS patients, many of whom died from the infection.

So who is *Cryptococcus gattii*?

When cryptococcosis became a major health concern, it was studied intensely. Attention then focused on infections occurring in Australian aborigines, which were very similar to cryptococcosis in AIDS. However, most patients did not have AIDS. In these

A child-centric microbiology education framework

special patients, a yeast was found that was almost the same as *C. neoformans* but with some different features. It was called *Cryptococcus gattii* and both are considered sibling species. Both occur on many different types of trees and in bird habitats, and both are rounded yeasts, which we acquire by inhaling air.

To avoid attack by our defences, these yeasts are able to make a sugar envelope, the capsule, and produce melanin, the substance that gives us a tan when we expose ourselves to sunshine, and which defends the yeast from attack by our oxidative mechanisms.

C. gattii is also a particularly aggressive pathogen, which causes outbreaks of cryptococcosis in both animals and humans. The most significant outbreak of disease by this microbe began on Vancouver Island (British Columbia, Canada), at the turn of the 20th century (1999) and has continued for many years in the area while spreading down the pacific coast of the United States. Unlike *C. neoformans*, *C. gattii* can cause disease in apparently healthy humans and animals without immunodeficiency. Fortunately, however, it is much less common than *C. neoformans*.

The Cryptos are a pair of beastly MicroRogues!

So what do we do about the *Crypto* siblings?

Treatment. Cryptococcosis are infections that can be treated with drugs called antifungals, as they fight the fungi. It is important, however, to detect these diseases as early as possible, to apply effective antifungal treatment from the beginning, and to consider whether there is an undetected immunity problem in the patient that is contributing to the infection, especially when the causative yeast is *C. neoformans*.

But, although today we know how to treat and control HIV, in developing countries especially on the African continent, there are still many cases of cryptococcosis among uncontrolled AIDS patients.

Public Health. The important link between these yeasts and birds, especially the link between the urban pigeon and *C. neoformans*, is an example of One Health - the pivotal environmental involvement in pathogen reservoirs and disease transmission - and one of the reasons for the importance of monitoring the presence of these birds and their droppings in many cities around the world.