 10.1111/j.1469-0691.2008.02632.x

The medical importance of *Chlamydiae*

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With this special issue on chlamydial infections, our intention is that non-specialist readers will be exposed to the many aspects of chlamydiology, including epidemiology, taxonomy, biodiversity, evolution, diagnosis and treatment, and hopefully that even specialists will appreciate this overview of the pathogenesis of chlamydial infections.

Chlamydia trachomatis is the most common bacterial cause of urogenital infections. As described in the review by Bébéar and de Barbeyrac, this strictly intracellular pathogenic bacterium frequently causes an asymptomatic or paucisymptomatic infection that remains undetected and thus untreated for a prolonged period. From an evolutionary perspective, this is favourable for the pathogen, as untreated chronic infections may spread. The chronic inflammation then results in long-term complications such as tubal infertility and increased risk of extra-uterine pregnancy. To reduce this morbidity and to reduce transmission, large routine screening programmes have been initiated. However, some strains of *C. trachomatis* have lost a DNA region that is targeted by frequently used PCRs. This example of rapid counter-evolution, called 'the Swedish mutant paradigm', occurred incredibly early after the introduction of these molecular tests into screening programmes. It shows that *Chlamydia* spp. may evolve rapidly, despite being intracellularly located and despite exhibiting a highly conserved core genome. It also shows the importance of such a strict intracellular bacterium remaining unrecognized. This example of rapid counter-evolution should encourage clinical microbiologists to use a panel of diagnostic tools and/or to develop tests that include several simultaneous targets for this pathogen.

Like *C. trachomatis*, *Chlamydia psittaci* may also remain undetected in clinical practice, as this strictly intracellular bacterium does not grow on the media used routinely in clinical diagnostic laboratories. However, in contrast to the frequently chronic and paucisymptomatic *C. trachomatis* infections, pneumonia caused by *C. psittaci* may be acute, severe and life-threatening. The identification of *C. psittaci* infections is important in order to guide public health prevention measures and to guarantee an adequate and targeted antibiotic therapy. In their review, Beeckman *et al.* highlight the zoonotic potential of this pathogen and propose clues for diagnosis and therapy of *C. psittaci* infections.

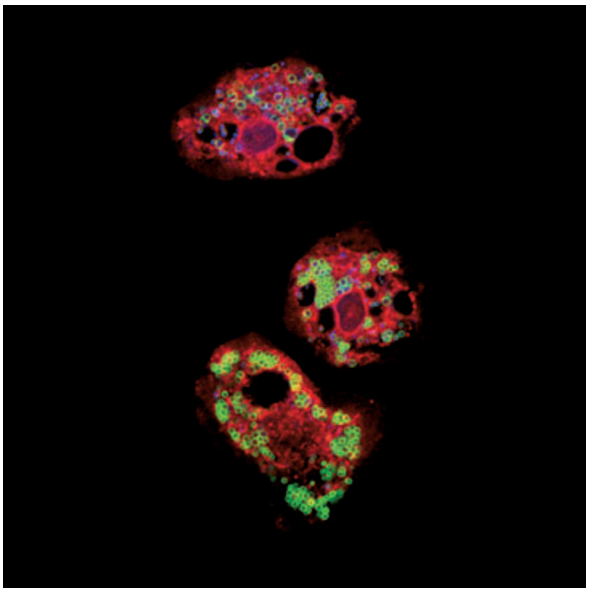

FIG. 1. *Parachlamydia acanthamoebae* strain Hall's coccus within *Acanthamoebae castellanii*. The cell wall of *P. acanthamoebae* (in green) was stained with mouse anti-*Parachlamydia* antibodies, whereas its DNA was stained with 4′,6-diamidino-2-phenylindole (DAPI). The amoeba was stained with concavalin A. Confocal microscopy, 1000× magnification.

Parachlamydia acanthamoebae is another strictly intracellular bacterium, belonging to the order *Chlamydiales*. It easily grows within free-living amoebae (Fig. 1). It represents an emerging agent of community-acquired pneumonia and bronchiolitis. My own contribution to this special issue on chlamydial infections reviews the current knowledge accumulated during the last 10 years concerning this *Chlamydia*-related bacterium. Like that of *C. psittaci*, the pathogenic role of *P. acanthamoebae* in humans was initially suspected following an outbreak. Moreover, like *C. psittaci*, *P. acanthamoebae* might be zoonotically transmitted. It may also, like *Legionella pneumophila*, be transmitted through exposure to aerosols, as free-living amoebae—its natural hosts—are largely present in water. This review on *P. acanthamoebae* is not only addressed to microbiologists interested in this evolutionarily distant member of the *Chlamydiales*, but also proposes a strategy to determine the pathogenic role of any new bacterial species.

Like *C. psittaci* and *P. acanthamoebae*, *Chlamydia pneumoniae* mainly causes lower respiratory tract infections. In their review, Blasi *et al.* summarize the main diagnostic approaches to *C. pneumoniae* infections. Although serology is still largely used to diagnose *C. pneumoniae* infections, molecular tools are increasingly being used for the diagnosis of this chlamydial infection. In addition to its role as an agent of respiratory tract infections, *C. pneumoniae* might also be involved in other diseases, e.g. arteriosclerosis. Although its role in this setting remains controversial, the possible underlying pathogenic mechanisms have been studied in detail. The review by Kern *et al.* presents the recent advances of basic research in understanding the pathogenesis of *C. pneumoniae* infections. As with all other members of the *Chlamydiales*, the strictly intracellular nature of *C. pneumoniae* makes the research more complex, i.e. by preventing direct assessment of the role of bacterial factors through forward genetics and by necessitating specific skills to grow and isolate these bacteria. Despite the difficulties faced by chlamydiologists, the many recent advances illustrate the dynamic nature of the current research in this area.