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By Brendan Borrell

Baghdad hack

It was over 50°C (130°F) outside when Mark Lyles slipped on his flak jacket, helmet and goggles, grabbed his N95 dust mask, and climbed aboard a Blackhawk helicopter at the US Central Command Zone in Iraq four years ago. The prop blades kicked up a fine grit that would hang in the air for days. Lyles knew that these particles, finer than talcum powder and teeming with microbes, would become lodged deep within the lungs



A dust cloud in Iraq.

of the soldiers stationed there. Part of his job as a Navy captain and cell biologist was to sample Iraq's soil on the ground and in the air; he presented some surprising findings from that analysis this September at the 10th annual Inhaled Particles conference in Sheffield, UK. "It's constantly there," Lyles says of the dust, "sometimes it's bad and sometimes it's worse."

They call it the Baghdad Hack. According to one recent estimate by Navy doctors, more than two-thirds of soldiers coming back from Iraq experience at least one episode of respiratory illness, and 36 troops have come down with a rare and sometimes fatal condition known as acute eosinophilic pneumonia. In only a handful of cases have symptoms been pinned to an infectious agent. (According to Asmahan Alshubaili, a Kuwaiti physician, it is rare to find a local family in nearby Kuwait without a case of bronchial asthma.)

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Researchers at the Walter Reed Army Institute of Research reported three cases of severe pneumonia caused by Q fever, transmitted by dust containing

the rickettsia-like bacterium *Coxiella burnetti*. The dastardly dust has also found its way into medical and dental equipment at frontline treatment facilities, which may be one reason why, since the start of the war, hundreds of wounded soldiers have had their limbs and lives threatened by "Iraqibacter," the antibiotic-resistant *Acinetobacter baumannii*, following injuries. Captain Lyles himself came down with an acne-like skin infection that's common among troops and whose origins are obscure.

When Lyles, who has a PhD in cellular and structural biology, pulled out his electronic particle counter during surveys in Iraq, it would often exceed the instrument's maximum of 700 million particles per cubic meter. He took air and dust samples at eight different sites along the Iraq-Kuwait border and Fed-Exed them to the Army Engineer Research and Development Center in Vicksburg, Mississippi. There, a team led by microbiologist Herbert Frederickson attempted to identify pathogens based on their 16s DNA sequences, and grew them up on seven different types of media, including sheep's blood agar, which indicates whether they can digest blood.

The team recovered 174 different isolates, and identified six genera of bacteria and seven genera of fungi. "Some organisms were generally located just about everywhere," Lyles says, "but some organisms were specific to some areas." The samples included strange organisms like *Cryptococcus ubeqistanis* and the rare *Bacillus mojavensis*. Lyles also found plenty of known pathogens, including *Staphylococcus* and *Neisseria*, a species of which has been implicated in meningitis outbreaks following dust storms in sub-Saharan Africa (see [They came from above](#)). He has also found possible strains of *Acinetobacter*, not yet confirmed by DNA analysis. Lyles also noticed that different organisms populate different sizes of dust particles, and different sizes vertically segregate in the airstream. "If you were going to be a pathogen in a snake you wouldn't want to be high in the air," he says, "but for camels you want to be on a smaller particle. Heaven knows the dynamics of how they do that!"

In 2005, Lyles prepared a report for the office of the Navy Surgeon General that recommended that N95 dust protection masks be issued upon request and that convoys be protected from dust exposure. Lyles is still not sure whether the Navy ever took up his initial recommendations, and the Navy Surgeon General's office did not respond to repeated requests for comment. "Sometimes you come up with a lot of things and they get filed away," Lyles says, "It is a war zone."