Microbes and Metals:

Middle East Dust Exposure and Potential Acute and Chronic Health Risks!

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Disclosure Information

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Middle East Dust: Why is it important?

Health Protection Issues

- *Contains Heavy Metals*
- *Harbors Pathogens*
- *High Percentage in Respirable Range*

Exposure Issues

- *Contact*
- *Ingestion*
- *Inhalation*


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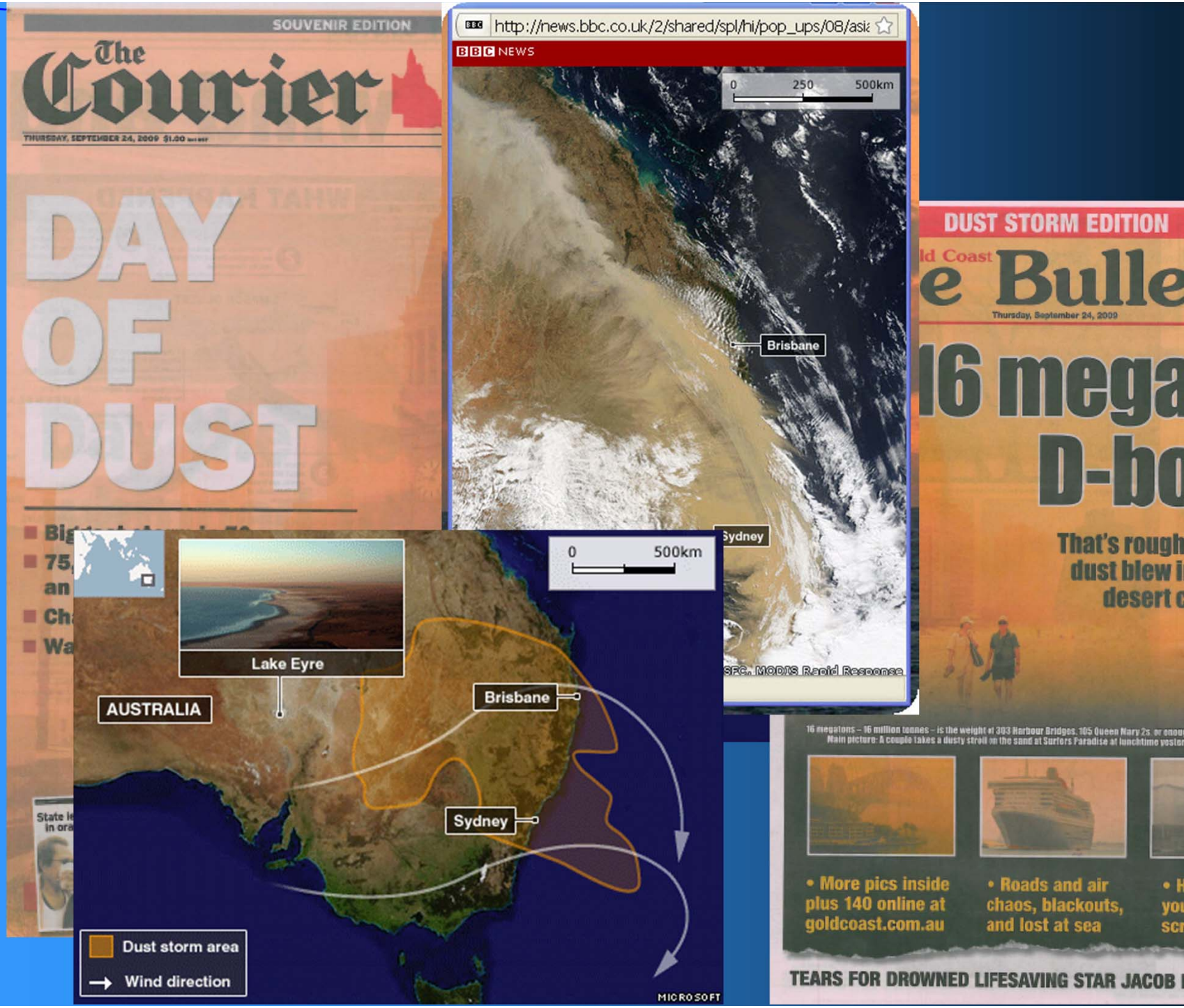
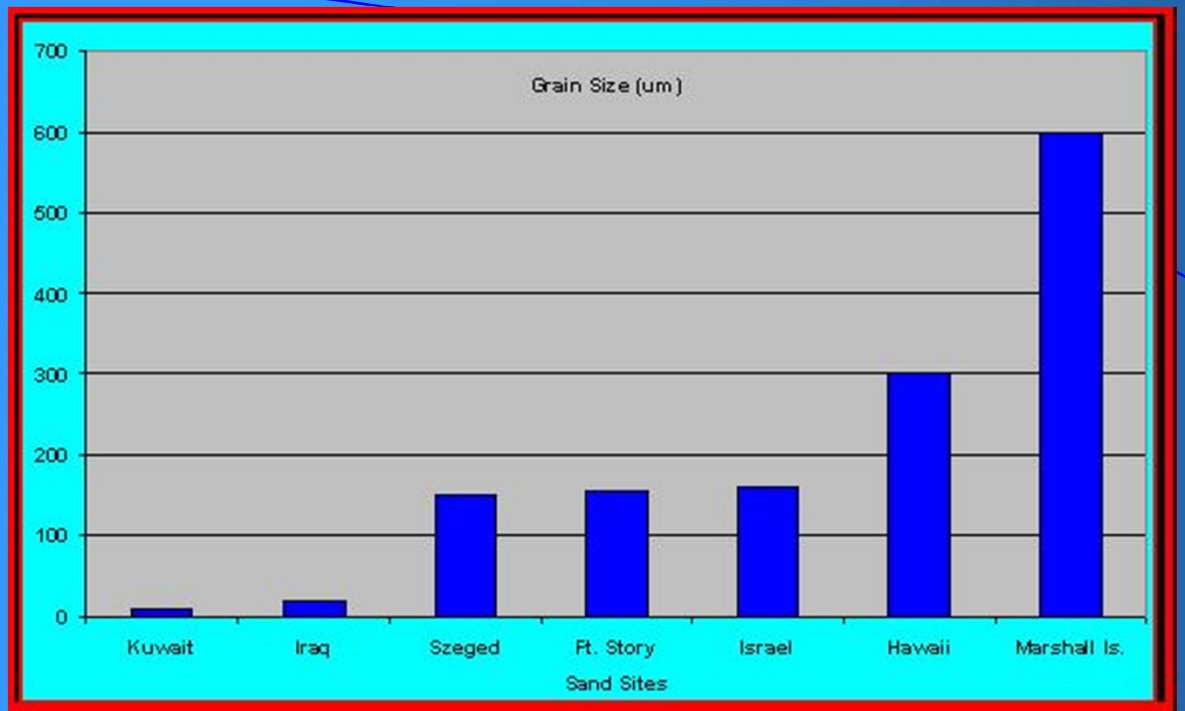
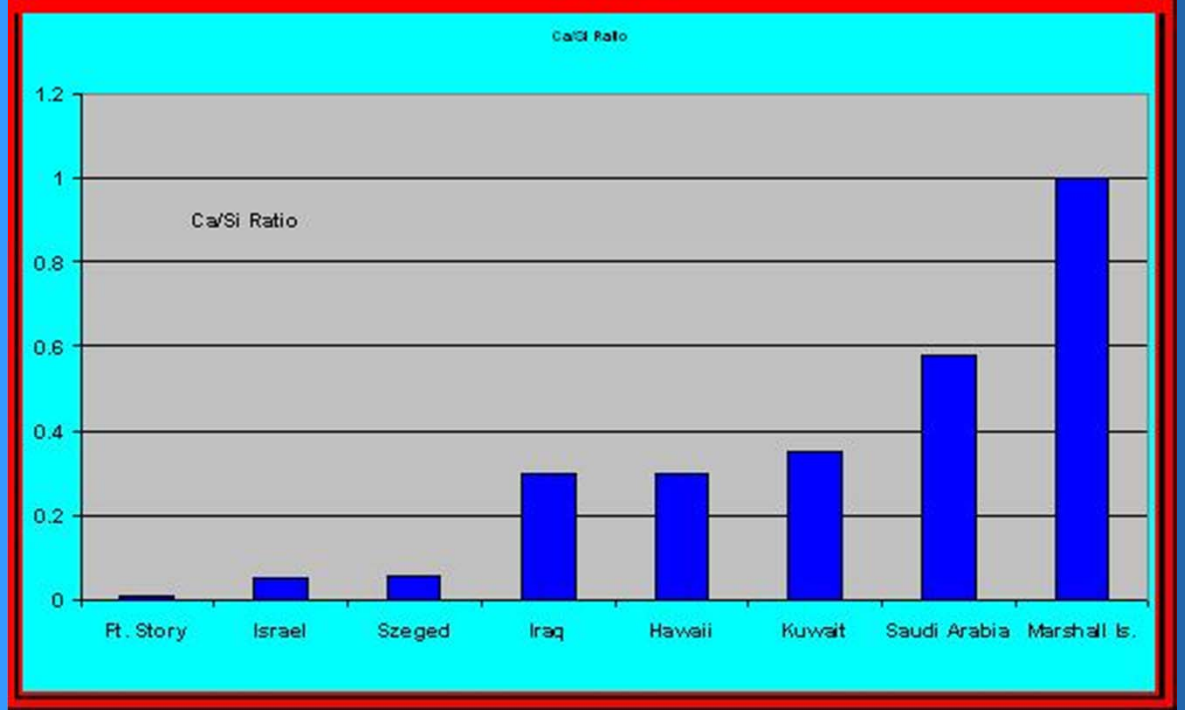
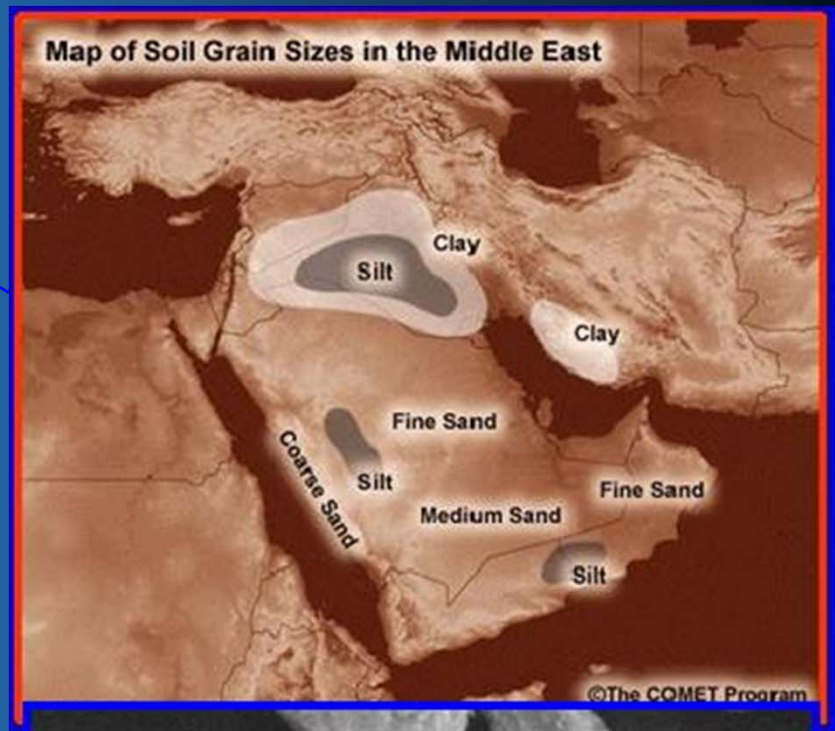

SOUVENIR EDITION
The Courier
THURSDAY, SEPTEMBER 24, 2009 $1.00
DAY OF DUST
http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/08/asia
BBC NEWS
0 250 500km
Brisbane
Sydney
SPC, MODIS Rapid Response
0 500km
Lake Eyre
AUSTRALIA
Brisbane
Sydney
Dust storm area
Wind direction
MICROSOFT
DUST STORM EDITION
Gold Coast Bulletin
Thursday, September 24, 2009
www.goldcoast.com.au
16 megaton D-bomb
That's roughly how much dust blew in the day the desert came to town
16 megatons – 16 million tonnes – is the weight of 303 Harbour Bridges, 185 Queen Mary 2s, or enough to fill Skilled Park 11.5 times
Main picture: A couple takes a dusty stroll on the sand at Surfers Paradise at lunchtime yesterday
• More pics inside plus 140 online at goldcoast.com.au
• Roads and air chaos, blackouts, and lost at sea
• How to wash your car without scratching it
TEARS FOR DROWNED LIFESAVING STAR JACOB LOLLBACK Page 6

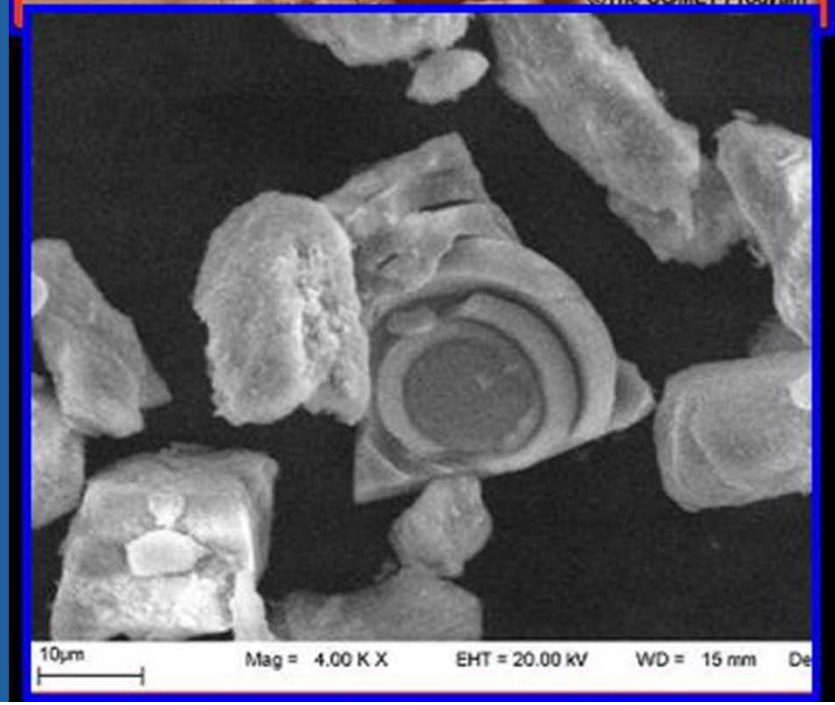

TURKEY
Lake Urmia
Dahūk
Northeastern Highlands
Al Mawşil (Mosul)
Arbīl
Uplands Region
Kirkūk
As Sulaymānīyah
SYRIAN ARAB REPUBLIC
ISLAMIC REPUBLIC IRAN
Tigris
Euphrates
Sāmarrā'
Tharthar Depression
Ba'qūbah
Ar Ramādī
Baghdad
Abu Dibbs Depression
Al Kūt
Al Hillah
Karbalā'
Alluvial Plains
An Najaf
Ad Dīwānīyah
Al 'Amārah
As Samāwah
An Nāsirīyah
Euphrates
Tigris
Al Basrah
Desert Plateau
KUWAIT
Kuwait
Persian Gulf
SAUDI ARABIA
3 000 m
2 000 m
1 000 m
500 m
200 m
0
National capital
Governorate capital
International boundary
River
Intermittant river
50 100 150 200 150 300 km
50 100 150 200 mi
Source: UN Cartographic Section DPI, GRID-GENEVA, USGS EDC

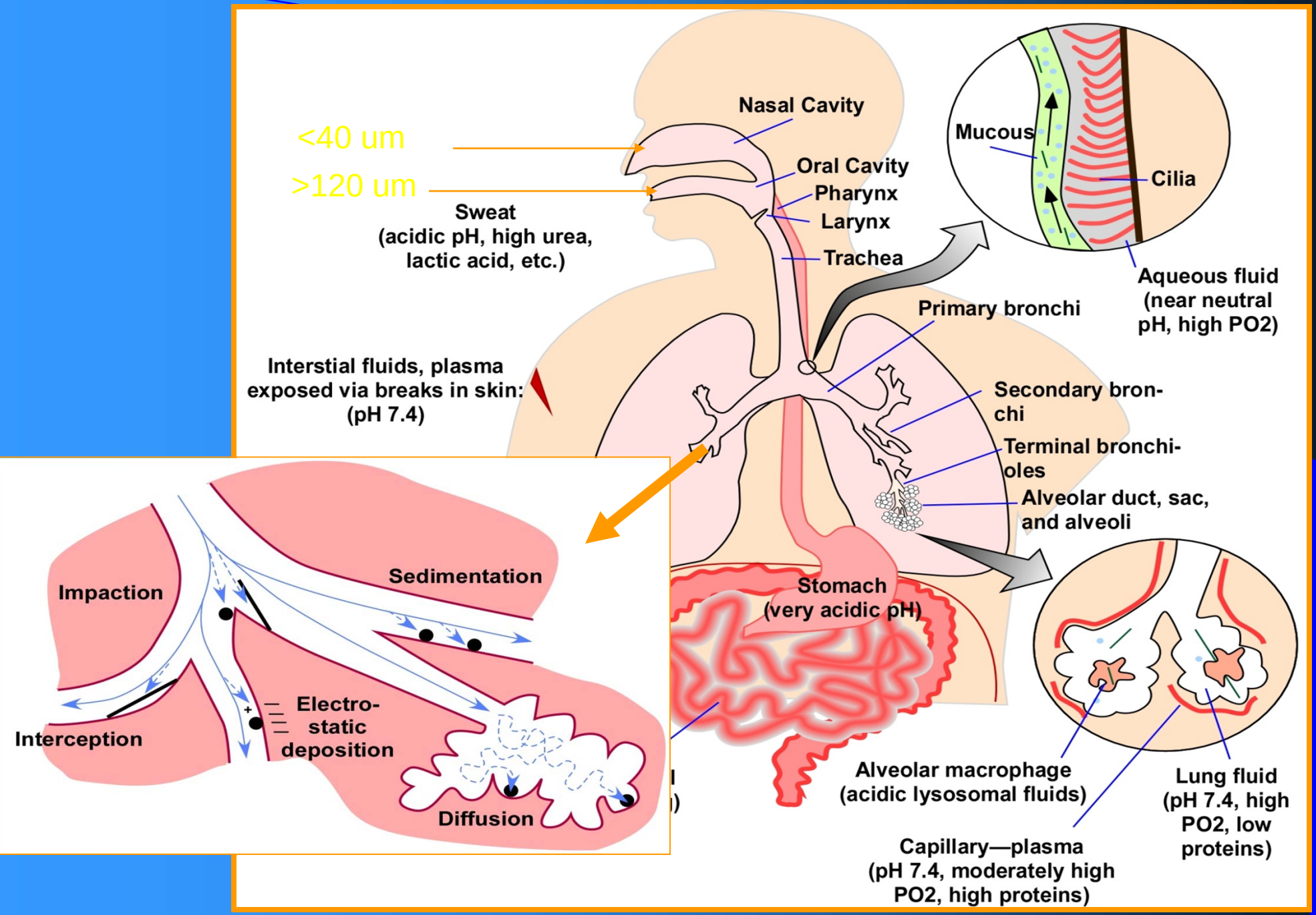

UNEP
Desk Study on the Environment in Iraq
United Nations Environment Programme


Grain Size (um)
700
600
500
400
300
200
100
0
Kuwait
Iraq
Szeged
Ft. Story
Israel
Hawaii
Marshall Is.
Sand Sites


Ca/Si Ratio
1.2
1
0.8
0.6
0.4
0.2
0
Ca/Si Ratio
Ft. Story
Israel
Szeged
Iraq
Hawaii
Kuwait
Saudi Arabia
Marshall Is.


Map of Soil Grain Sizes in the Middle East
Clay
Silt
Clay
Fine Sand
Coarse Sand
Silt
Medium Sand
Fine Sand
Silt
©The COMET Program


10µm
Mag = 4.00 K X
EHT = 20.00 kV
WD = 15 mm


<40 um
>120 um
Sweat
(acidic pH, high urea,
lactic acid, etc.)
Nasal Cavity
Oral Cavity
Pharynx
Larynx
Trachea
Primary bronchi
Secondary bron-
chi
Terminal bronchi-
oles
Alveolar duct, sac,
and alveoli
Mucous
Cilia
Aqueous fluid
(near neutral
pH, high PO2)
Interstial fluids, plasma
exposed via breaks in skin:
(pH 7.4)
Stomach
(very acidic pH)
Alveolar macrophage
(acidic lysosomal fluids)
Capillary—plasma
(pH 7.4, moderately high
PO2, high proteins)
Lung fluid
(pH 7.4, high
PO2, low
proteins)
Impaction
Sedimentation
Interception
Electro-
static
deposition
Diffusion




Summary of Exposure

TSP (Total Suspended Particle Mass) (mg/m^3) PM10 (10 um) and below

= 0.001 mg/m^3 (NIDBR Lab, Great Lakes, IL)
= 0.137 mg/m^3 (Camp Virginia Clinic, Kuwait - indoors)
= 2.469 mg/m^3 (Highest hourly average - 0800)
= 9.114 mg/m^3 (Highest TSP reading)
= 2.051 mg/m^3 (Highest daily maximum - 18 June @1300)

** NOTE: >9.999 mg/m^3 readings recorded during peak dust storms*

Count (Total Number of Suspended PM 10 Particles /m^3)

Size Range = 0.5 um to 10 um

= 1,314,906 (NIDBR Lab, Great Lakes, IL)
= 12,290,917 (Camp Virginia Clinic, Kuwait - indoors)
= 107,261,167 (Highest average hourly maximum @1300) (SD = 54,959,015)
= 588,633,693 (Highest daily maximum – 18 June @1300)
= 127,643,273 (Highest avg daily (0700-1900) max 13 June) (SD = 34,311,341)

** NOTE: >20,000,000 counts /ft^3 readings recorded during peak dust storms or >706,293,334 particles m^3*

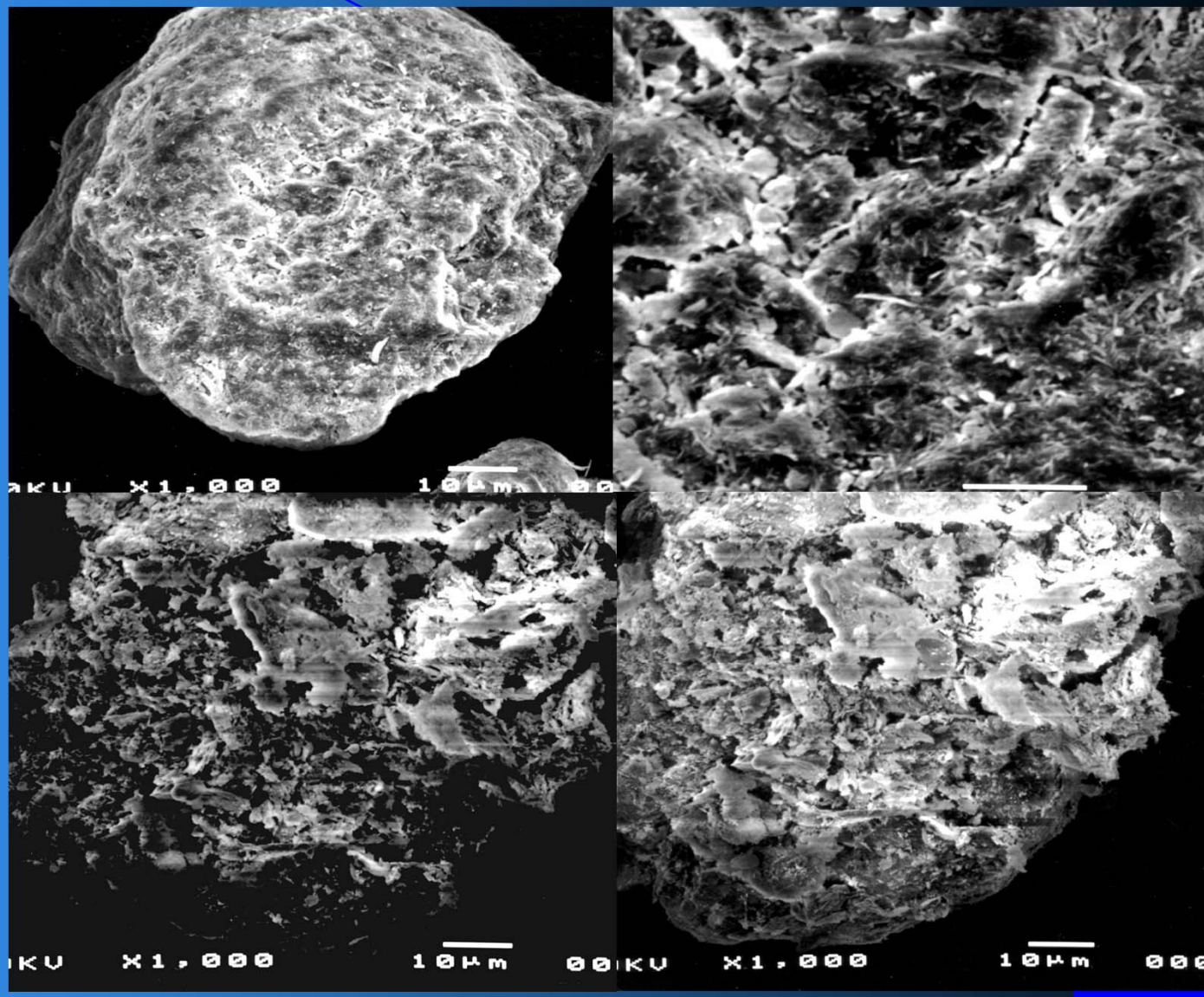
Size Range = 5.0 um to 10 um

= 36,515 (NIDBR Lab, Great Lakes, IL)
= 507,824 (Camp Virginia Clinic, Kuwait - indoors)
= 6,884,417 (Highest average hourly maximum @1300) (SD = 4,142,586)
= 44,571,347 (Highest daily maximum - 18 June @1300)
= 5,244,651 (Highest average daily maximum - 13 June) (SD = 3,632,501)

Particle Dynamics

Physical / Chemical Characteristics

- ✓ *Widespread Distribution*
- ✓ *Hygroscopic*
- ✓ *Respirable*
- ✓ *Easily Airborne*
- ✓ *Non-clumping*
- ✓ *Bio-carrier*

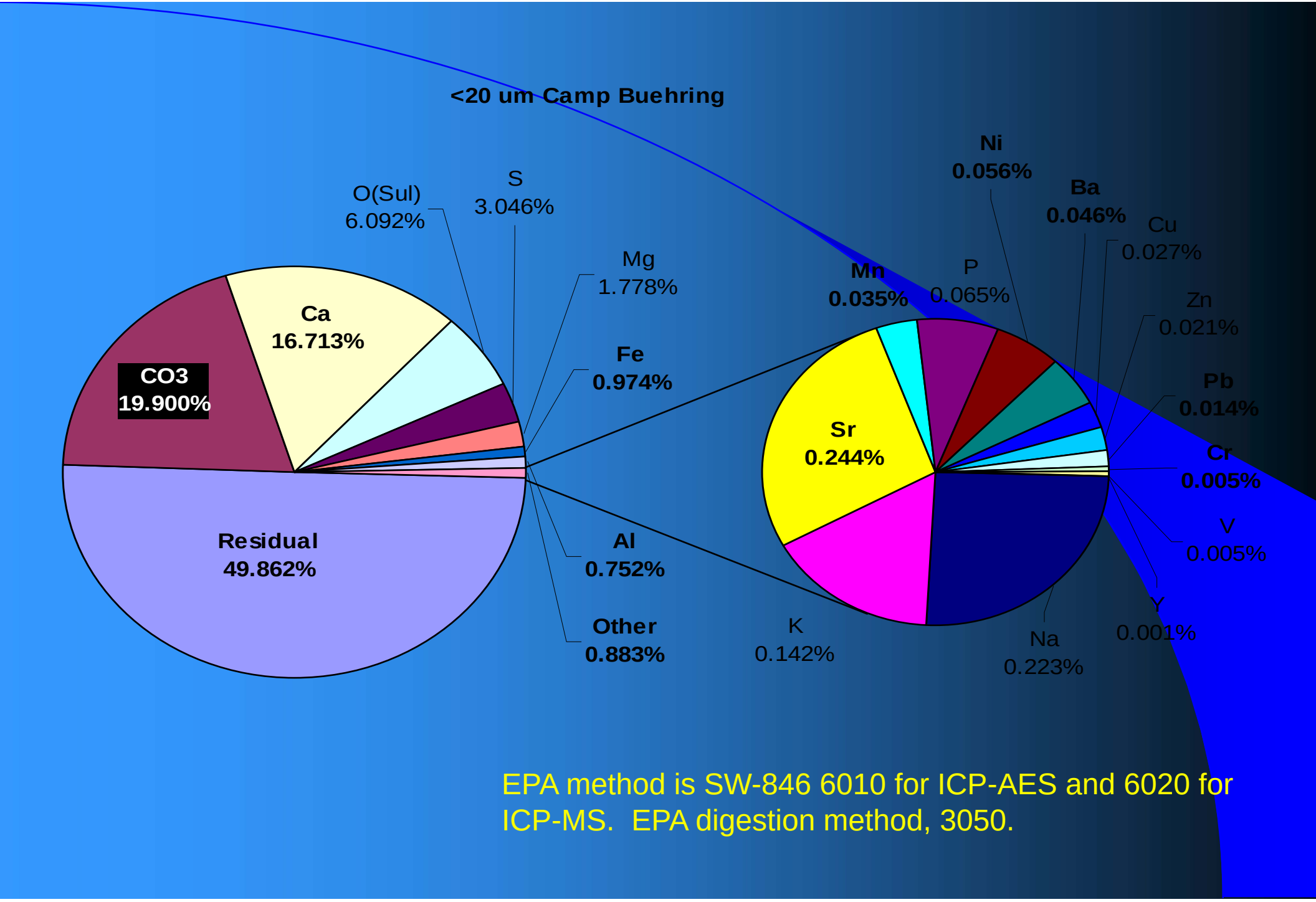


Elemental Analysis: Metals

Acid Extractables Tent 1

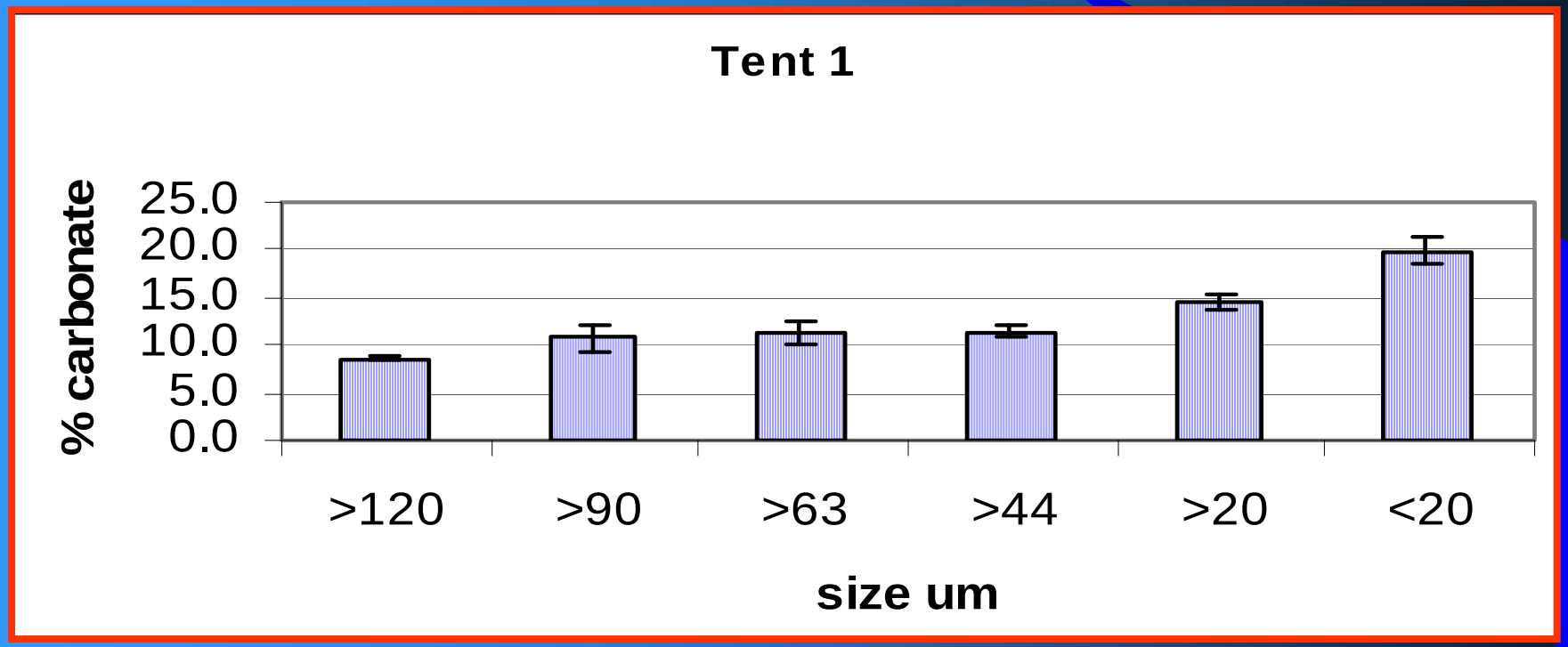
EPA method is SW-846 6010 for ICP-AES and 6020 for ICP-MS. EPA digestion method, 3050.

Sample	>120um	>90um	> 63um	>44um	>20um	<20um
Mass	0.2627	0.2596	0.2488	0.2626	0.2441	0.2504
Element	% dry wt	%dry wt	%dry wt	%dry wt	%dry wt	%dry wt
Sr	0.0697	0.0642	0.0995	0.1978	0.2718	0.2436
Ba	0.0068	0.0072	0.0081	0.0192	0.0308	0.0463
P	0.0160	0.0170	0.0234	0.0433	0.0549	0.0649
S	2.4413	2.4230	3.0444	4.0062	3.6646	3.0458
Mg	0.6844	0.8718	1.2672	1.5505	1.7234	1.7784
V	0.0022	0.0026	0.0032	0.0041	0.0046	0.0049
Na	0.1759	0.1963	0.1672	0.2056	0.2123	0.2225
Al	0.2969	0.3832	0.4948	0.6351	0.7164	0.7521
Ca	9.0134	10.3057	11.7495	13.9148	15.3535	16.7133
Zn	0.0053	0.0039	0.0042	0.0070	0.0112	0.0206
Cu	0.0060	0.0050	0.0036	0.0054	0.0077	0.0268
Ni	0.0089	0.0094	0.0169	0.0197	0.0305	0.0564
Y	0.0009	0.0006	0.0006	0.0007	0.0009	0.0010
K	0.0502	0.0653	0.0612	0.0942	0.1186	0.1422
Mn	0.0174	0.0222	0.0268	0.0305	0.0331	0.0352
Fe	0.3506	0.4844	0.6889	0.8419	0.9601	0.9736
Cr	0.0027	0.0032	0.0039	0.0049	0.0052	0.0052
Pb	0.0111	0.0038	0.0049	0.0056	0.0076	0.0138

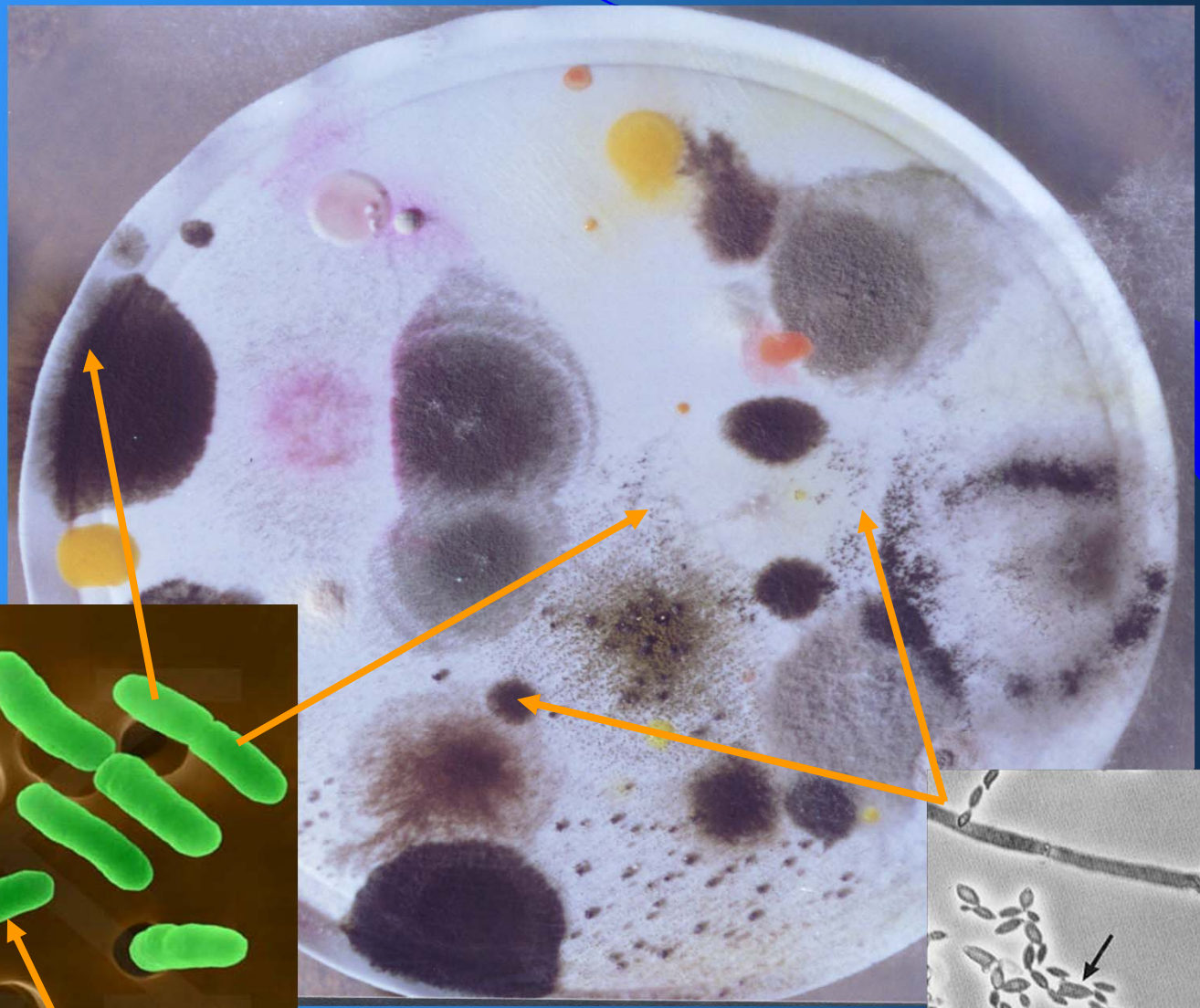


EPA method is SW-846 6010 for ICP-AES and 6020 for ICP-MS. EPA digestion method, 3050.

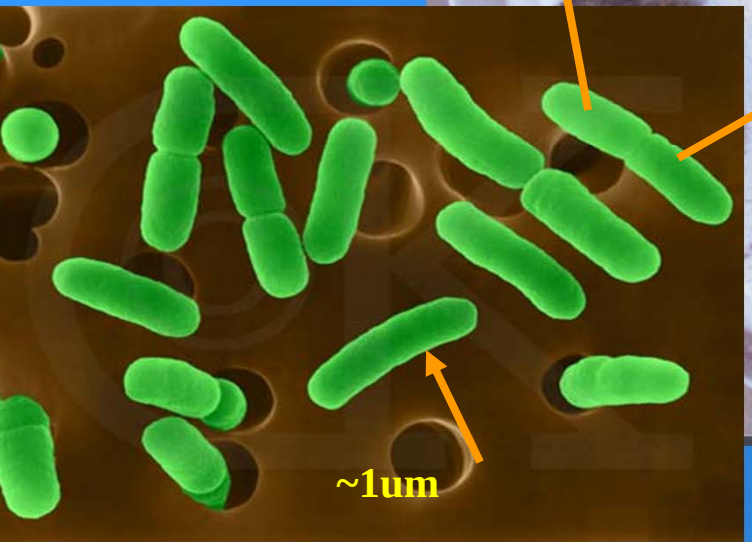
Chemical Analysis: Carbonates



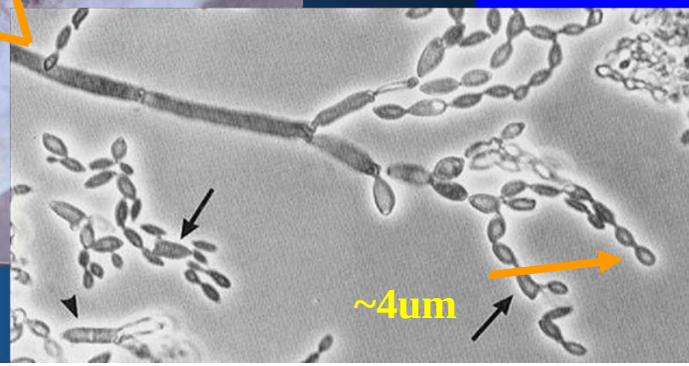
Microbiological Study of Dust Particles



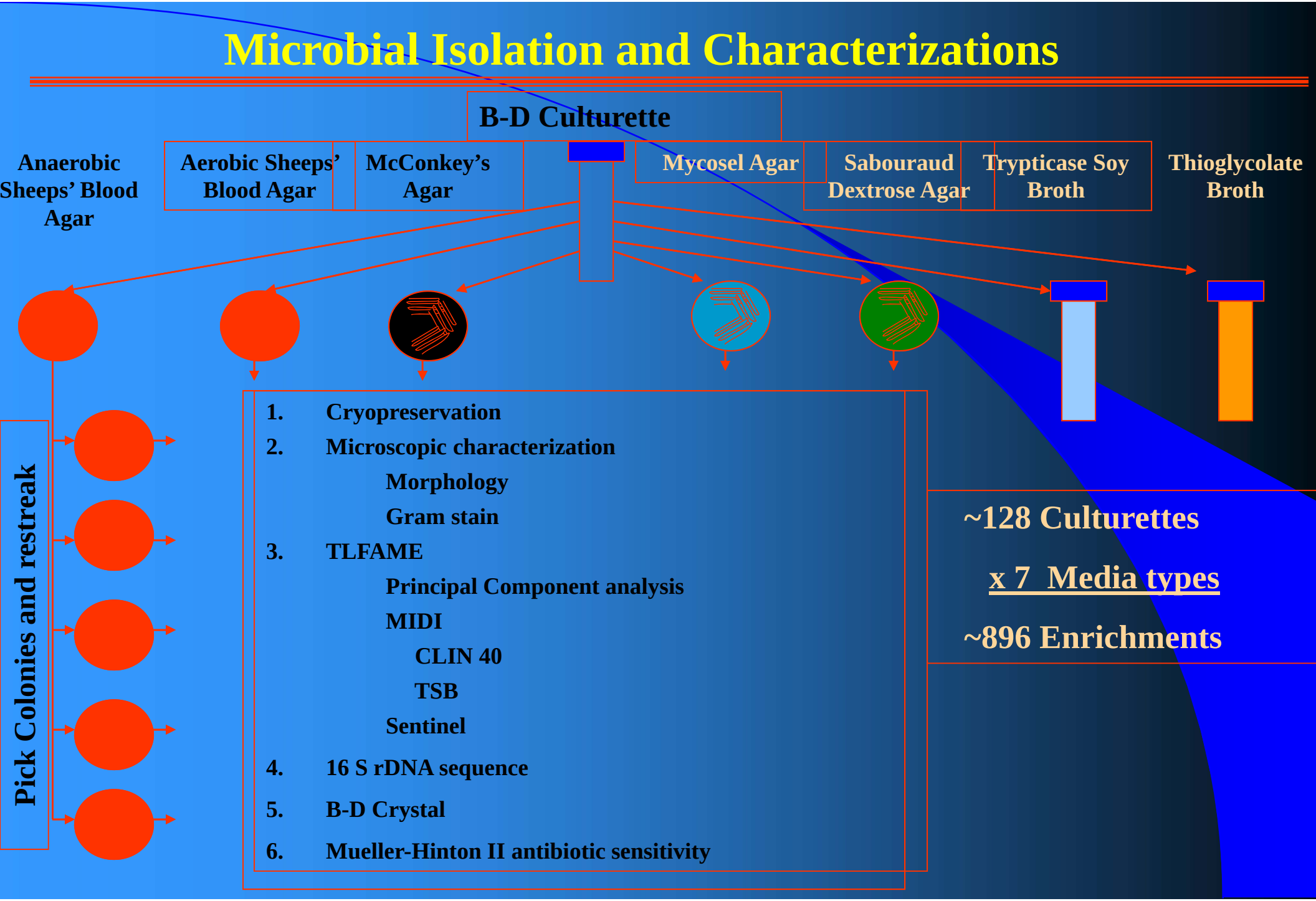
Bacteria



Fungi



Microbial Isolation and Characterizations



Summary of Soil Isolates

Best ID thus Far	Comment
Neisseria meningiditis	meningitis
Staphylococcus aureus	cystic fibrosis
Bacillus circulans	gastro-enteritis
Pantoea agglomerans	septic arthritis
Pseudomonas agrici	
Ralstonia paucula	opportunist-septicemia, peritonitis, abscesses
Staphylococcus pasteuri	various infections
Arthrobacter crystallopoietes	
Pseudomonas balearica	cystic fibrosis
Paenibacillus thiaminolyticus	bacteremia
Bacillus vedderi	obligate alkaliphile
Bacillus subtilis	
Pantoea agglomerans	epiphyte
Pseudomonas pseudoalcaligenes	
Cryptococcus albidus	septicemia and meningitis
Bacillus clausii	Oral bacteriotherapy
Kurthia gibsonii	Diarrhea
Bacillus firmus	alkaliphile; bread spoilage
Staphylococcus kloosii	various infections
Bacillus mojavensis	biosurfactant
Bacillus licheniformis	food poisoning
Pseudomonas oryzihabitans	Hickman catherter biofilm

Culturettes

Isolates of Concern - Hemolytic

Isolate Number	Location	Culturette	Hemolytic	Genus and Species Identification							
				16S	Match	TLFAME CLIN 40	Match	Sentinel	Match	TSB	Match
56	Kuwait 2	**Blue**	Beta	Submitted		Legionella vjordanis	0.16	Microbacterium luteolum	0.25	Microbacterium-liquefaciens*	0.42
69	Kuwait 2	Black	Beta	Submitted		Micrococcus luteus G	0.80	Arthrobacter luteolus	0.49	Arthrobacter-atrocyaneus	0.69
70	Kuwait 2	Blue	Beta	Submitted		Micrococcus luteus C	0.81	Arthrobacter luteolus	0.54	Arthrobacter-atrocyaneus	0.68
72	Kuwait 2	Blue	Beta	Submitted		Tatlockia micdadei*	0.26	Arthrobacter oxydans	0.04	NO MATCH	
I-10	Udari	Orange	Alpha	Pantoea agglomerans	0.95	Neisseria cinera	0.20	Providencia rettgeri	0.02	Ewingella americana	0.78
I-11	Udari	Blue	Alpha	Pseudomonas agrici	0.01	No data		No data		Pseudomonas stutzeri	0.90
I-17	Udari	Black	Alpha/Beta	Paenibacillus thiaminolyticus	0.03	No data		No data		Paenibacillus thiaminolyticus	0.53
I-18	Udari	Orange	Beta	Submitted		Bacillus subtilis	0.52			Bacillus subtilis	0.90
I19	Udari	Blue	Beta/Alpha	Bacillus subtillis subtillis	0.00	No data		No data		Bacillus subtilis	0.92
I-20	Udari	Green	Alpha	Pantoea agglomerans	0.01	Pantoea aggomerans	0.62	Ralstonia paucula	0.27	Pantoea agglomerans	0.82
I-30	Tallil AB	Orange	Beta	Bacillus mojavensis	0.00	Bacillus subtilis	0.42	No Match		Bacillus atrophaeus	0.87
I-31	Tallil AB	Blue	Beta	Bacillus licheniformis	0.02	No data		No data		Bacillus licheniformis	0.61
I-32	Tallil AB	Green	Beta	Flavimonas oryzihabitans	0.00	No data		No data		No data	

Bacteria Isolated from Kuwait and Iraq that have Shown Antibiotic Resistance.

ulture#	Description	Location	Culturette	Hemolysis	Colony Morphology	MIDI @ DE Environmental	Similarity Index	Comment
8	BSSI	Babylon	Green	No	Dry Fungal type colonies; White spreader on TSA & Blood	Bacillus circulans	0.61	N/A
12	>20<44 um	Udairi	Green	No	Cream colored mucoid colonies on Blood and TSA;	**Not growing when others sent off**	N/A	N/A
16	>44<63 um	Udairi	Green	No	Small mucoid colonies on Blood; Spreading mucoid on TSA;	Staphylococcus wameri	0.881	N/A
20	>44<90 um	Udairi	Green	alpha	Small dry cream colored colonies	Pantoea agglomerans Pantoea agglomerans	0.82 0.711	GC subgroup GC subgroup
24	<20 um	Udairi	Green	No	Shiny yellowish/cream spreading colonies on TSA; Purple spreader on Blood;			
28	TAB II Sand A	Tallil	Green	No	Large shiny mucoid colonies	Not sent to MIDI	N/A	N/A
32	TAB II Sand B	Tallil	Green	beta	Clear white cauliflower colony on TSA; Shiny clear runny colony on Blood;	Not sent to MIDI	N/A	N/A

ulture#	MIDI @ MS CLIN 40	Similarity Index	Comment	MIDI @ MS Sentenial	Similarity Index	MIDI 500 bp rDNA sequnce analysis	% Diff	Comments
8	No match/Too dilute	N/A	N/A	No match				
12	Vibrio alginolyticus Aeromonas hydrophilia	0.366 0.366	N/A N/A	Ralstonia paucula Erwinia mallotivora	0.127 0.103			
16	Pseudomonas stutzeri	0.44	N/A	Pseudomonas balearica	0.097			
20	Pantoe aggomerans Aeromonas hydrophilia	0.623 0.386	GCsubgroup N/A	Ralstonia paucula Buttiauxella gaviniae	0.274 0.175	Pantoea agglomerans	0.85%	Plant/Human Pathogen
24								
28	Not Extracted	N/A	N/A					
32	Not Extracted	N/A	N/A			Flavimonas oryzihabitans	0.10%	Hickman Cat Pathogen

Fungal Isolates

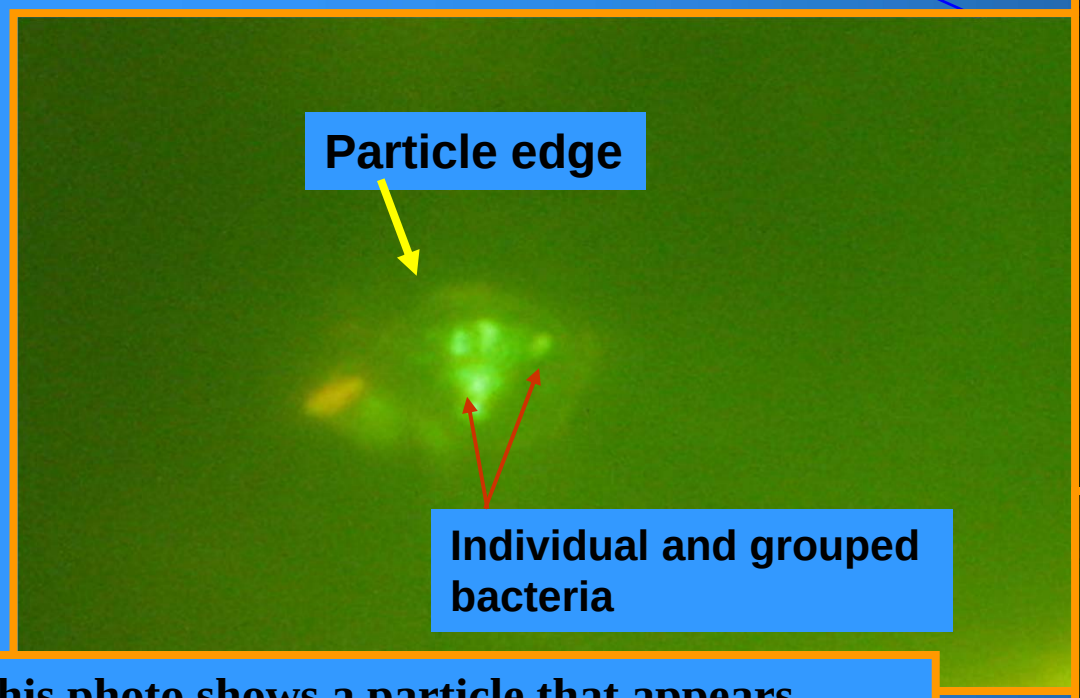
~300 bp of D2 region of LSU rDNA

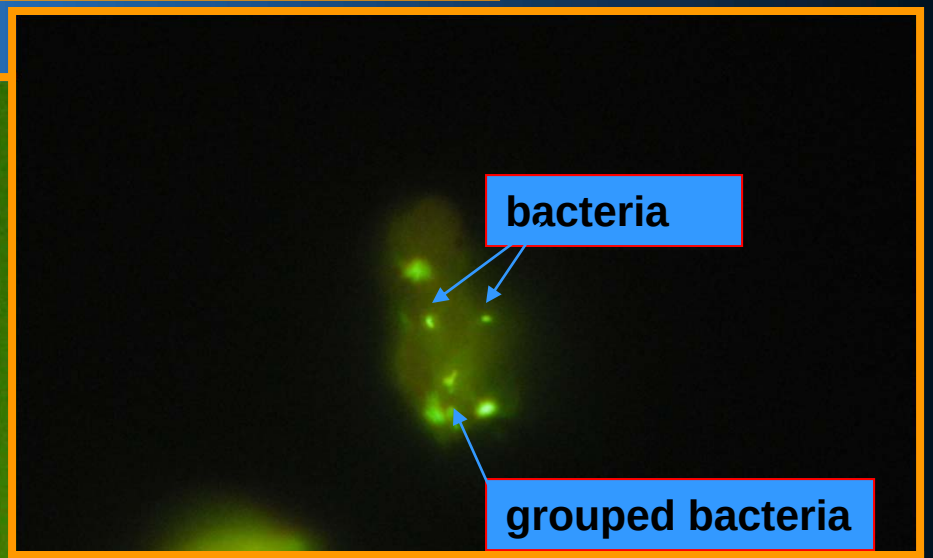
Microseq Library database									
Midi D2(300 bp)LSU rRNA :	% diff	LSU D2 Genbank Database	% ID	Associated Disease					
Allewia eureka	0.31	Ulocladium sp.	99						
Allewia eureka	4.64	Cryptococcus uzbekistanensis	100						
Allewia eureka	0.31	Ulocladium sp.	99	Unknown					
Altemaria altemata	0	Alternaria sp	100	Plant pathogen					
Rhodotorula minuata	5.73	Rhodotorula minuata	99	Eye infections					
Cryptococcus albidus	2.44	Cryptococcus sp.	100	Cryptococcus neoformans - meningoencephalitis					
Ulocladium chartarum	0.31	Stemphylium sp	99	Fungal biocontrol agent					
Filobasidium uniguttulatum	4.64	Cryptococcus uzbekistanensis	100	Teleomorph of Crytococcus, non pathogenic yeast					
Ulocladium consortiale	0	Stemphylium sp	100	Cutaneous mycoses					
Ulocladium chartarum	0.31	Stemphylium sp	99						
Mortierella polycephala	7.1	Mortierella polycephala	92	Pulmonary mycosis in cattle					
Embellisia chlamydospora	0	Ulocladium sp.	99	Unknown					
Filobasidium uniguttulatum	4.64	Cryptococcus uzbekistanensis	100						
Penicillium camembertii	0	Penicillium sp.	100						
Cryptococcus albidus	0	Cryptococcus albidus	100						
Allewia eureka	0.31	Ulocladium sp.	99						
Embellisia chlamydospora	0	Ulocladium sp.	99						
Filobasidium uniguttulatum	4.64	Cryptococcus uzbekistanensis	100						
Embellisia chlamydospora	0	Ulocladium sp.	99						
Filobasidium uniguttulatum	4.64	Cryptococcus uzbekistanensis	100						
Penicillium camembertii	0	Penicillium sp.	100						
Allewia eureka	0.31	Ulocladium sp.	99	Plant pathogen					
Phoma glomerata	0	Phoma herbarum	99						

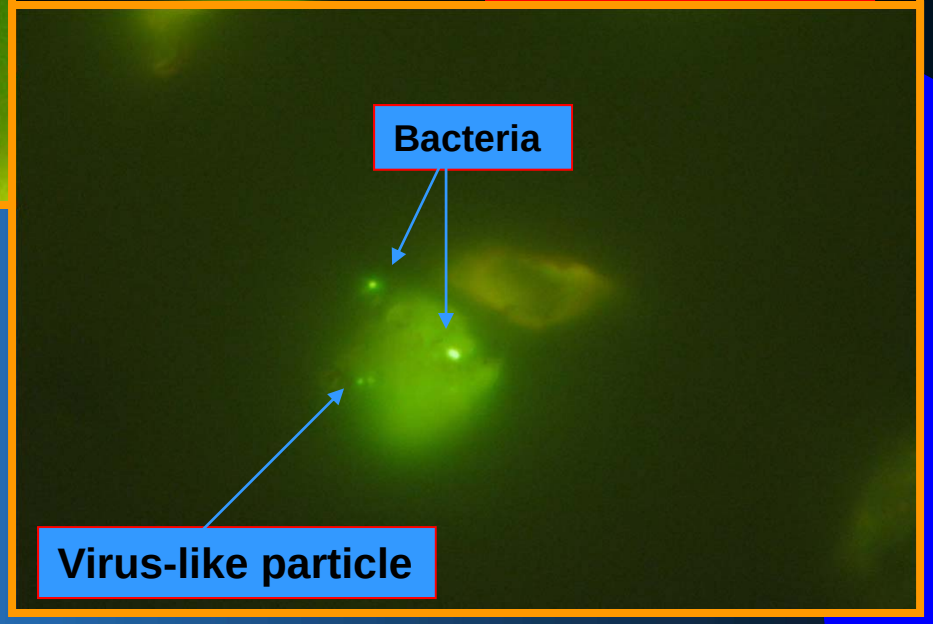
Microbiology Summary

N0.	Site	Hemolysis on Blood aga	MIDI @ DE Environmental Database ID	Similarit Index	MIDI @ MS CLIN 40 Database ID	Similarit Index	MIDI @ MS Sentenial Database ID	Similarit Index	MIDI 500 bp rDNA sequnce analysis	% Difference		Best ID thus Far
2	Babylon	No	Pseudomonas stutzeri	0.597	Pseudomonas stutzeri	0.503	**Neisseria meningitis**	0.357				***Neisseria meningitis***
							Neisseria meningitis	0.29				
							Neisseria cinerea	0.29				
5	Babylon	No	Staphylococcus epidermidis	0.827	Staphylococcus aureus	0.676	**Staphylococcus aureus**	0.609				***Staphylococcus aureus***
			Staphylococcus epidermidis	0.78	Staphylococcus warneri	0.596	Staphyloccoccus epiderimidis	0.576				
			Staphylococcus capitis	0.753	Staphylococcus aureus	0.569	Staphyloccoccus hominis	0.497				
8	Babylon	No	**Bacillus circulans**	0.61	No match/Too dilute	N/A	No match					***Bacillus circulans***
9	Udairi	Alpha hemoly	Not sent to MIDI	N/A	Not Extracted	N/A						*None*
10	Udairi	Alpha hemoly	Ewingella americana	0.778	Neisseria cinera	0.204	Providencia rettgeri	0.023	**Pantoea agglomerans**	0.95%	Species	***Pantoea agglomerans***
			Salmonella typhimurium	0.592	Aeromonas veronii	0.175	Arcobacter skirrowii	0.018				
			Pantoea agglomerans	0.568	Neisseria cinera	0.169	Erwinia amylovora	0.017				
11	Udairi	Alpha hemoly	Pseudomonas stutzeri	0.896	Not Extracted	N/A			**Pseudomonas agrici**	1.34%	Genus	***Pseudomonas agrici***
			Pseudomonas balearica	0.659								
			Pseudomonas resinovorans	0.584								
12	Udairi	No	**Not growing when others s**	N/A	Vibrio alginolyticus	0.366	**Ralstonia paucula**	0.127				***Ralstonia paucula***
					Aeromonas hydrophilia	0.366	Erwinia mallotivora	0.103				
					Neisseria mucosa	0.335	Ralstonia basilensis	0.1				
14	Udairi	No	**Not growing when others s**	N/A	Staphyloccoccus epiderimidis	0.419	**Staphylococcus pasteuri**	0.207				***Staphylococcus pasteuri***
							Staphylococcus caprae	0.185				
							Staphylococcus warneri	0.135				
15	Udairi	No	Virgibacillus pantothenticus	0.677	Bacillus coagulans	0.432	Arthrobacter atrocyaneus	0.414	**Arthrobacter crystallopoietes**	0.00%	Species	***Arthrobacter crystallopoietes***
			Micrococcus luteus	0.499	Dermobacter hominis	0.327	Agromyces ramosus	0.283				
			Bacillus atropheus	0.477	Kocuria-varians(Micrococcus)	0.316						
16	Udairi	No	Staphylococcus warneri	0.881	Pseudomonas stutzeri	0.44	**Pseudomonas balearica**	0.097				***Pseudomonas balearica***
			Staphylococcus epidermidis	0.754	N/A	N/A						
			Staphylococcus epidermidis	0.61	N/A	N/A						
17	Udairi	Beta/Alpha	Paenibacillus thiaminolyticus	0.534	Not Extracted	N/A			**Paenibacillus** thiaminolyticus	2.97%	Genus	***Paenibacillus*** *thiaminolyticus*
			Bacillus atrophaeus	0.464								
18	Udairi	Beta hemolyti	Bacillus subtilis	0.901	Bacillus subtilis	0.52	**Bacillus vedderi**	0.656				***Bacillus vedderi***
			Bacillus atrophaeus	0.697	N/A	N/A	Bacillus mojavensis	0.642				

Kuwait dust, Camp Buehring, size fraction 10 to 20um



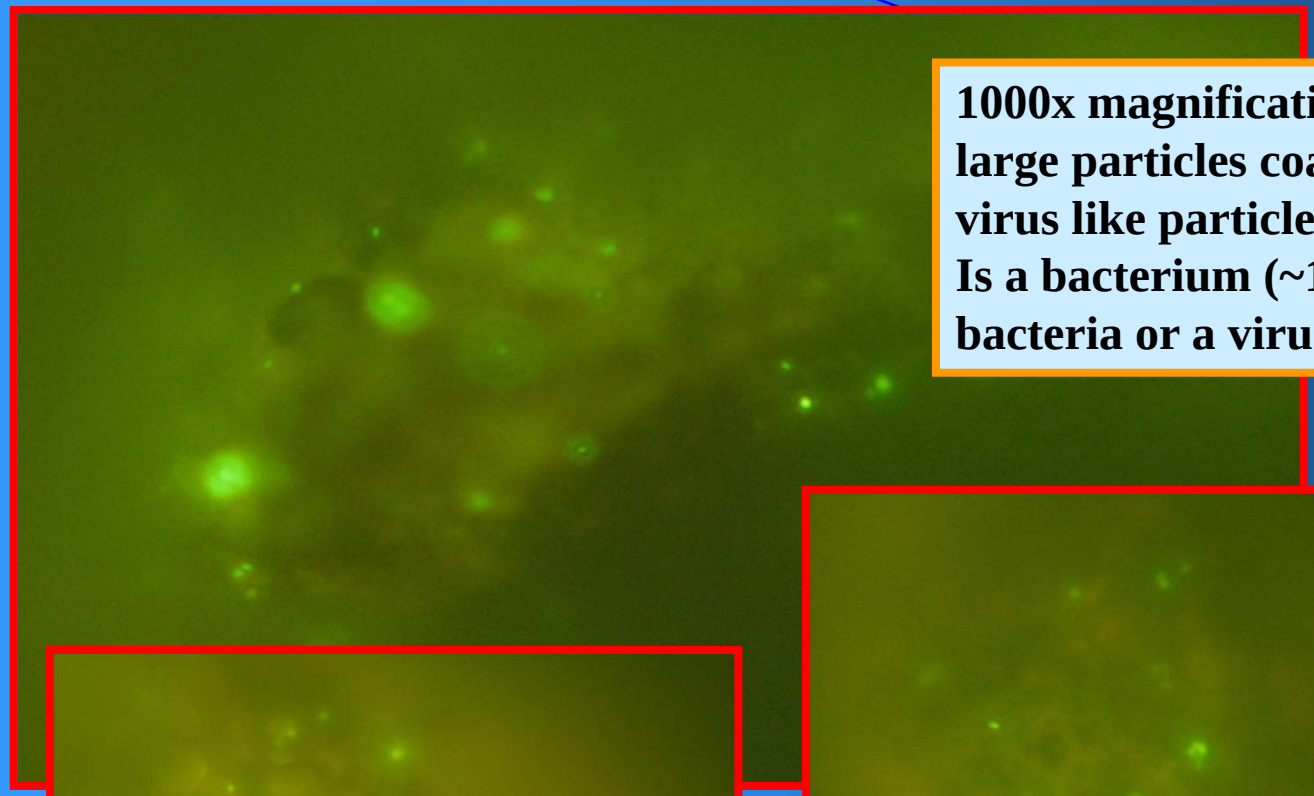




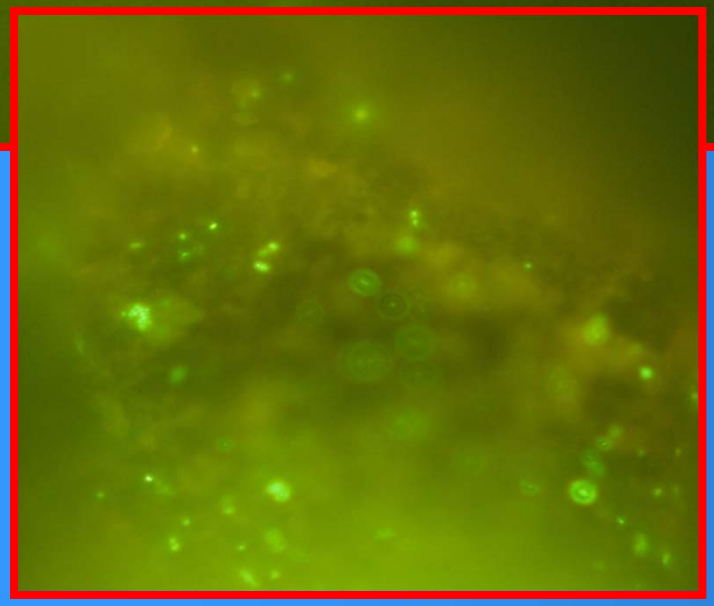
This photo shows a particle that appears to contain numerous bacteria in its core rather than on its surface. Bacteria size ~1um. 1000X with digital zoom.

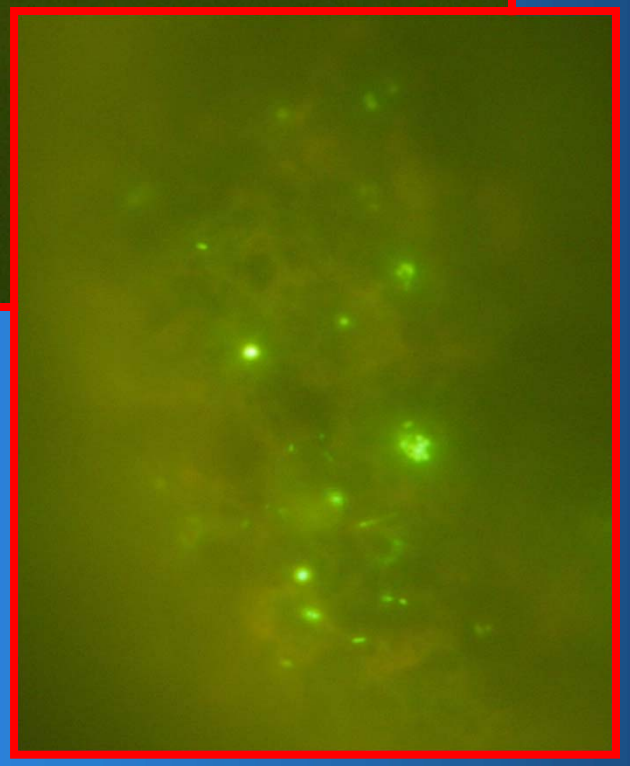
Sterilization Problems!

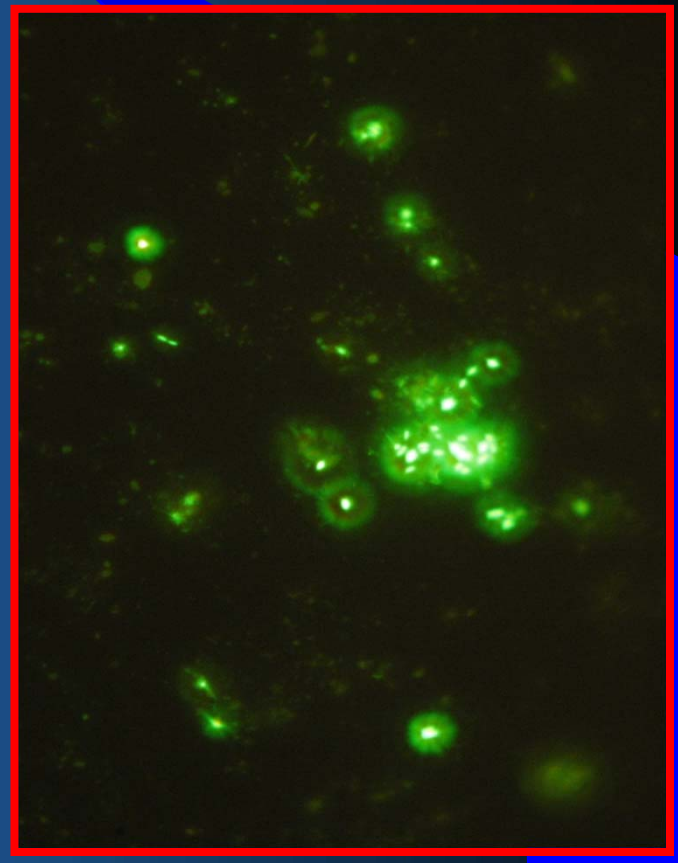
Kuwait Dust, Sample #2 raw



1000x magnification. These images show large particles coated with bacteria and virus like particles. Each fluorescing particle Is a bacterium (~1um in size), group of bacteria or a virus-like particle







Sprinkle particles (> 20 µm) onto agar

Sheeps' Blood Agar

Many zones of hemolysis but very poor colony development.

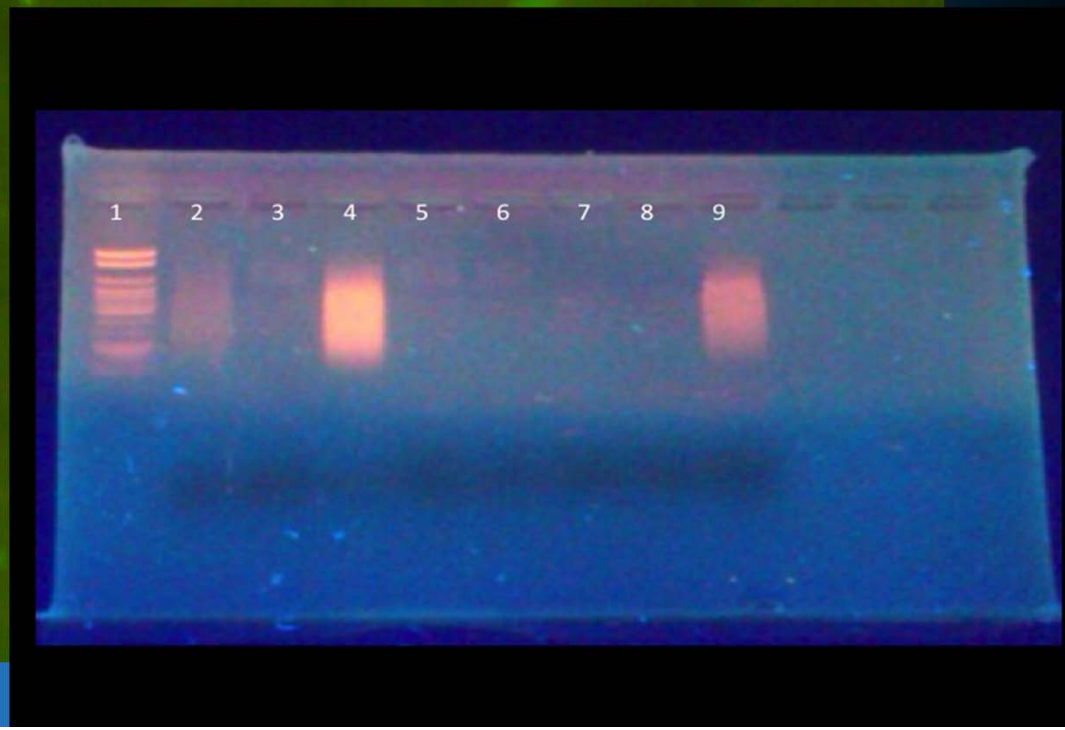
Trypticase Soy Agar

Weird and wonderful colonies but most were mixtures of cell types.

Low Nutrient PTYG Agar

Poor colony separation and fungi over grew plates after 48 hours.

VIRUSES

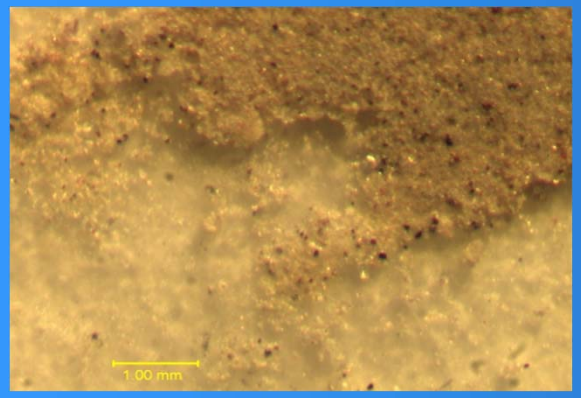


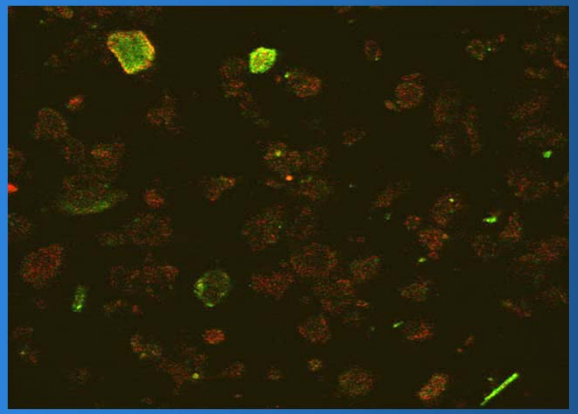
COMPARISONS

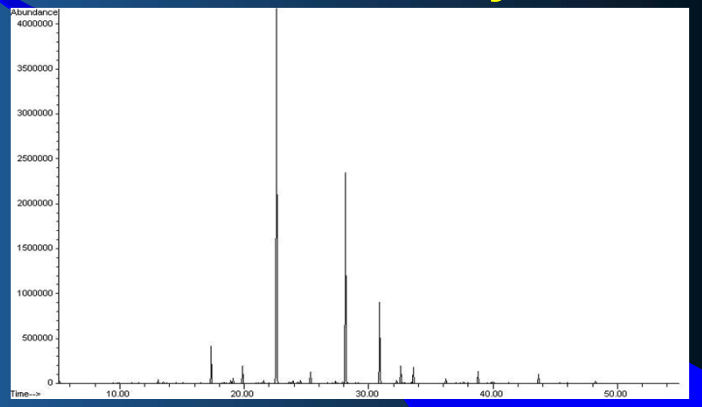
Laboratory Comparisons of Iraqi and Ft. Irwin Dust

Light Microscopy | **Fluorescent Microscopy** | **PLFAME Analysis**

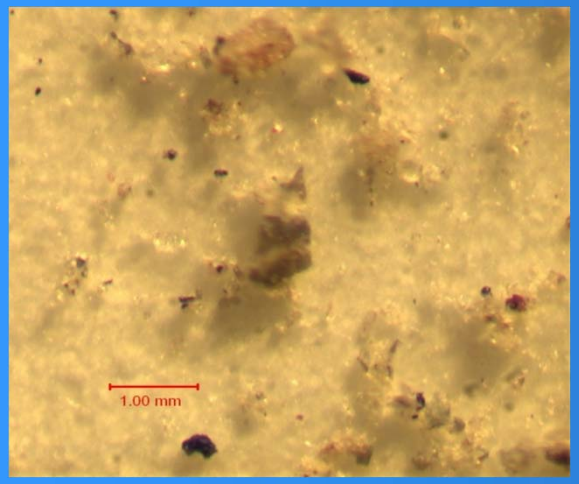
Iraq

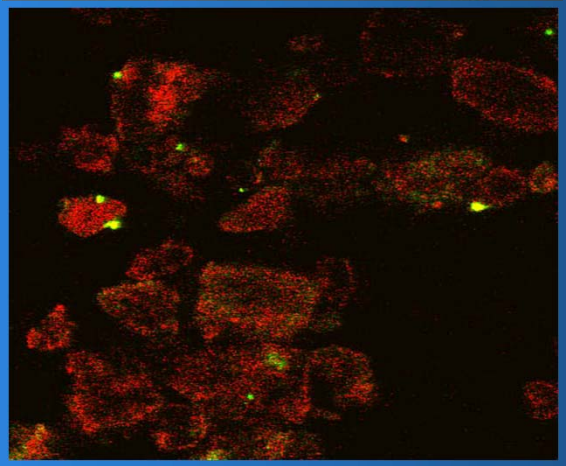


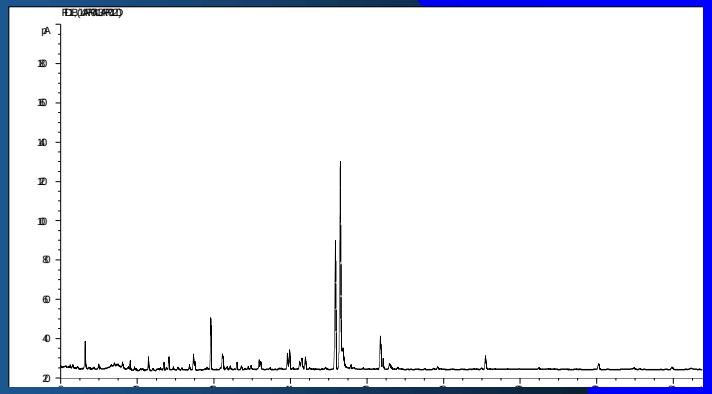




Ft. Irwin







Ultrastructure | **Biological Structure** | **Microbial Community Composition**

The Problem….

- **Environmental dust from the Middle East is ubiquitous and human exposure is extremely high.**
- **These particulates ARE inhabited by bacteria, fungi, and viruses…. And they contain a variety of bioaccessible metals posing a significant hazard.**
- **There ARE potential health risks……**

Background

MEDICAL GEOLOGY: DUST EXPOSURE AND POTENTIAL HEALTH RISKS IN THE MIDDLE EAST

MARK B. LYLES
Research Program Integration and Mission Development, Bureau of Medicine and Surgery, Washington, DC, USA

In the Middle East, dust and sand storms are a persistent problem and can deliver significant amounts of micro-particulate exposure via inhalation into the mouth, nasal pharynx, and lungs due to the fine size and abundance of these micro-particulates. The chronic and acute health risks of this dust inhalation have not been well studied nor has the dust been effectively characterized as to chemical composition, mineral content, or microbial flora. Scientific experiments were therefore designed to study the Kuwaiti and Iraqi dust as to its physical, chemical, and biological characteristics and for its potential to cause adverse health effects. First, dust samples from different locations were collected and processed and exposure data collected. Initial chemical and physical characterization of each sample including particle size distribution and inorg followed by characterization of biologic flora of the dust, i viruses.

Dust can range in both composition and particle si location. In the Middle East, dust and sand storms are a p during the spring and summer months. Desert sand in the mostly of quartz (SiO_2) but the finer dust consists primarily silicate core and can be respired into the lungs due to th (Richards et al. 1993). The dust particles predominately c quartz crystals (~25%). The size distribution of airborne par to ~150+ µm depending on wind velocity.

Inhabitants of deserts can develop Desert Lung progressive fibrosis resulting from silica-containing dust de Lung Syndrome generally develops after years of heavy (Nouh, 1989). An acute desert-related lung disease c Pneumonitis was found to occur following inhalation of droppings (Korenyi-Both et al. 1992). In a second paper describe a novel condition triggered by exceptionally fine sa Saudi Arabian peninsula (Korenyi-Both et al. 199 immunosuppression aggravated by opportunistic infectio ailments were brought on by exposure to the ubiquitous f Persian Gulf Syndrome (Korenyi-Both et al. 1997).

Army Times 12/13/2010

Washington

Iraq, Kuwait dust may carry dangerous elements

3 reports raise the possibility that troops' exposure could lead to heart and lung ailments

By Kelly Kennedy
kellykennedy@militarytimes.com

Researchers studying dust in Iraq and Kuwait say tiny particles of potentially hazardous material could be causing a host of problems in humans, from respiratory ailments to heart disease to neurological conditions.

After taking samples, scientists found fungi, bacteria and heavy metals — including uranium — that could all cause long-term health effects.

"You can see the dust," said Dale Griffin, an environmental public health microbiologist with the U.S. Geologic Survey. "It's what we can't see that will get you."

Three recent reports detail the problems, and Griffin said there are more to come.

Navy Capt. Mark Lyles, who chairs the medical sciences and biotechnology department at the Center for Naval Warfare Studies, part of the Naval War College, co-authored with Griffin a report that they presented last year at the International Seminars on Planetary Emergencies in Italy.

The paper summarized their analysis of sand samples taken in 2004 in Iraq and Kuwait, which revealed a "significant biodiversity of bacterial, fungi and viruses of which 25 percent are known pathogens."

Just as troubling, according to the paper, was the presence of 37 elements — including 15 bioactive metals known to cause serious, long-term health effects in humans, including uranium.

Some of the toxins may occur naturally in the soil in the Middle East, and some may come from refineries or factories in industrial areas, Griffin said. He also said the toxins could have been exposed or loosened as U.S. Humvees and tanks churned up the hardened desert top layer that has held dust down for centuries.

In a separate study, Griffin researched dust in Kuwait and around the world, and reviewed other studies, and found that bacteria can be carried by the wind. He said that finding contradicts military researchers during the 1991 Persian Gulf War era who did no microbiological research because they incorrectly concluded the region was too hot for anything to live in the desert sand.

A recent Military Times analysis of military health data from 2001 to 2009 showed the rate of respiratory issues among active-duty troops rose by 32 percent; cardiovascular disease rose 30 percent; pregnancy and birth complications were up 47 percent; and neurological conditions, such as multiple sclerosis and Parkinson's disease, were up nearly 200 percent.

Researchers investigating dust in Iraq and Kuwait say they found a combination of fungi, bacteria and heavy metals that could cause long-term health problems.

The National Research Council of the National Academies released a report this year that said the Defense Department's Enhanced Particulate Matter Surveillance Program needs to be reworked, and that the military lacked sufficient data to properly study the health effects of particulate matter exposure.

That report came in the wake of two other military studies — one

matter and a broad array of respiratory and cardiovascular effects in the general population and in susceptible people."

The tiniest particles — up to 1,000 of which can sit on the head of a pin — embed deeply in the lungs along with whatever matter they carry. Griffin said he worries that the combination of bacteria, fungi and metal found in Iraq and Afghanistan can further

NavyTimes

http://www.navytimes.com/news/2010/07/navy_toxic_dust_071210w/

Study finds toxic metals in dust in Afghanistan

By Andrew Tilghman - Staff writer
Posted : Monday Jul 12, 2010 7:41:46 EDT

Here's another thing to worry about when you deploy: toxic dust.

A new Navy study suggests that dust from Afghanistan contains metals that may cause respiratory problems and brain damage.

"Afghanistan sand produces neurotoxicity ... with potential adverse health effects to our soldiers," according to a briefing of the study presented at a medical conference in June in Portland, Ore.

The Navy conducted the study in response to anecdotal concerns that the dust and dust storms common in the Middle East may be harmful. The dust samples were taken from Forward Operating Base Salerno near Khost, which was selected because of its relative isolation with no nearby industry that could skew results.

A close analysis of the Afghan dust found traces of manganese, a toxic chemical known to cause Parkinson's-like symptoms. Other metals found in the sand include silicon, iron, magnesium, aluminum and chromium.

Background

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, July 2011, p. 4285–4292 Vol. 77, No. 13
0099-2240/11/$12.00 doi:10.1128/AEM.00021-11

Application of a Broad-Range Resequencing Array for Detection of Pathogens in Desert Dust Samples from Kuwait and Iraq▽

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Baochuan Lin,[1] and David A. Stenger[1]

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Received 5 January 2011/Accepted 26 April 2011

A significant percentage of the human population is exposed to high levels of naturally occurring airborne dusts. Although the link between airborne particulate inhalation and a variety of respiratory diseases has long been established, little is known about the pathogenic role of the microbial component of the dust. In this study, we applied highly multiplexed PCR and a high-density resequencing microarray (RPM-TEI version 1.0) to screen samples of fine topsoil particles and airborne dust collected in 19 locations in Iraq and Kuwait for the presence of a broad range of human pathogens. The results indicated the presence of potential human pathogens, including *Mycobacterium*, *Brucella*, *Coxiella burnetii*, *Clostridium perfringens*, and *Bacillus*. The presence of *Coxiella burnetii*, a highly infectious potential biowarfare agent, was confirmed and detected in additional samples by use of a more sensitive technique (real-time PCR), indicating a high prevalence of this organism in the analyzed samples. The detection of potentially viable pathogens in breathable dusts from arid regions of Iraq and Kuwait underscores the importance of further study of these environments.

Debate Swirls Around Research Showing Lung Problems for Returned Troops

By JAMES DAO

As a teenager in northern New York, Gary Durham ran cross-country and hiked the Adirondack's high peaks. In Army basic training, he did two-mile runs in under 13 minutes. But after a yearlong deployment to Iraq with the 101st Airborne Division in 2003, he says he started gasping for air while just mowing the lawn.

An emerging body of research indicates that Mr. Durham is one of a significant number of American service members who are reporting respiratory problems like coughing, wheezing or chest pains that started during deployment and continued after they returned home.

In 2009, a major survey of military personnel, the Millennium Cohort Study, found that 14 percent of troops who had deployed reported new breathing problems, compared with 10 percent among those who had not deployed.

Though the percentage difference seems small, when extrapolated for the two million troops who have deployed since 2001, the survey suggested that at least 80,000 additional service members

But now, a fierce debate is under way

said Capt. Mark Lyles, the chairman of medical sciences and biotechnology at the Center for Naval Warfare Studies in Newport, R.I., who has studied dust from Iraq and Afghanistan.

On the other side of the debate are officials with the Pentagon and the Department of Veterans Affairs who assert that current research remains inconclusive. They acknowledge that some troops are returning with respiratory symptoms but say those problems vary widely depending on genetic background or location of deployment and are usually temporary.

"I think we are going to find that there is some increase in respiratory symptoms, and maybe even respiratory diagnoses," said Col. Lisa Zacher, a doctor who is the pulmonary consultant to the Army's surgeon general. "But I think we'll find the majority who deploy do not have long-term chronic pulmonary diseases related to deployment."

Mr. Durham's breathing struggles have proved to be long-term. When he returned to Fort Campbell, Ky., in 2004, Mr. Durham was coughing up phlegm daily. Running became impossible. Yet a

charged as a sergeant in 2005, an Army

JOSH ANDERSON FOR THE NEW YORK TIMES

Gary Durham of Smyrna, Tenn., says he has struggled to breathe since returning from Iraq. His son Larkin, 5, watched him undergoing treatment.

small airways

sair. Fifteen other biopsies led to diag-

"anyone who shows up at our clinics is going to get a state-of-the-art workup," she said.

Respiratory problems among return-

Another scientist affiliated with the government, Dr. Anthony Szema, was an author last year of a paper that found that previously deployed troops were more likely to report new cases of asthma than troops who had not deployed.

In more recent research, Dr. Szema, an allergy expert at the Stony Brook School of Medicine and the Northport Veterans Affairs Medical Center on Long Island, has found that previously deployed troops are far more likely than nondeployed troops to report breathing problems that lead doctors to order lung function tests. He calls the diverse lung problems he believes exist Iraq-Afghanistan War Lung Injury.

Colonel Zacher and other military officials have raised sharp questions about the research by Dr. Miller, Dr. Szema and Captain Lyles.

The officials say that many of Dr. Miller's patients were exposed to acidic smoke from a sulfur mine fire near Mosul, Iraq, in 2003 that may have injured their lungs, suggesting that those injuries are unique to a relatively small group of soldiers. Dr. Miller, however, said that some of his patients were deployed after 2003.

In a statement, the Navy said that Captain Lyles's work lacked "scientific

Newsline

THURSDAY, MAY 12, 2011

...waved. Photo by Rodrigo Abd, AP

...nt forces take ...ata airport
...ps pushed farther ...n reports, 4A

Memphis still ..., BBQ contest
...rd level, but "98% of our ...m official says. 4B.
...n home, find ruin. 3A.

...dbugs: Some ...tant germs
...resistant staph bacteria ...er hospital patients; ...s spread disease. 2A.

...ite HP Veer has ...splay and ...board. 4B.

Photo by Samsung

...n experts can't explain 'outbreak of insanity'
...engers have tried to open cockpit, ...while in flight. Experts say there's no ...orry: Exit, cockpit doors secure. 3A.

...s pass Filipinos as USA's ...-largest Asian group
...show Asians grew at same 43% rate ...s over the past decade. 3A.

...-trading conviction ...attle Wall Street
...send zero-tolerance message with ...nst co-founder of Galleon Group. 1B.

...ug combination helps ...atic cancer patients

By David Furst, AFP/Getty Im...

Tiny foe: Marines in Afghanistan are engulfed in dust researchers say could contain harmful partic...

Could dust be the cause of war vets' ailments?

Navy researcher links toxins in particles to a range of illnesses

By Kelly Kennedy
USA TODAY

COVER STORY

U.S. troops in Iraq, Afghanistan and Kuwait have inhaled microscopic dust particles laden with toxic metals, bacteria and fungi — a toxic stew that may explain everything from the undiagnosed Gulf War Syndrome symptoms lingering from the 1991 war against Iraq to high rates of respiratory, neurological and heart ailments encountered in the current wars, scientists say.

"From my research and that of others, I really think this may be the smoking gun," says Navy Capt. Mark Lyles, chair of medical sciences and biotechnology at the Center for Naval Warfare Studies at the Naval War College in Newport, R.I. "It fits everything — symptoms, timing, everything."

Lyles and other researchers found that dust particles — up to 1,000 of which can sit on the head of a pin — gathered in Iraq and Kuwait contain 37 metals, including aluminum, lead, manganese, strontium and tin. The metals have been linked to neurolo... cal disorders, cancer, respiratory a... ments, depression and heart disea... according to the Environmental P... tection Agency. Researchers belie... the metals occur naturally and as... byproduct of pollution.

Researchers in and out of the m... itary say that the particles are small... and easier to inhale than most du... particles and that recent droughts ... the region have killed desert shru... that helped keep down that dust. T... military's heavy vehicles have poun... ed the desert's protective crust into... layer of fine silt, Lyles says. Servic... members breathe the dust — and all... carries — deeply into their lungs.

The dust contains 147 kinds of ba... teria, as well as fungi that cou... spread disease, Lyles found. Since t... wars began in Iraq in 2003 and ... Afghanistan in 2001, the military h... seen a 251% increase in the rate ... neurological disorders per 10,000 a... tive-duty servicemembers, a 47% ri... in the rate of respiratory ailments a... a 34% increase in the rate of cardi... vascular disease, according to a US... TODAY analysis of military morbidi... records from 2001 to 2010.

Those increases have researche...

By Matthew Park, USA TODAY

Lyles: "This may be the smoking gun."

See two war veterans talk about their illnesses and learn more about dust research at usatoday.com

Please see COVER STORY next page

New York Times, Monday June 20,2011

Background

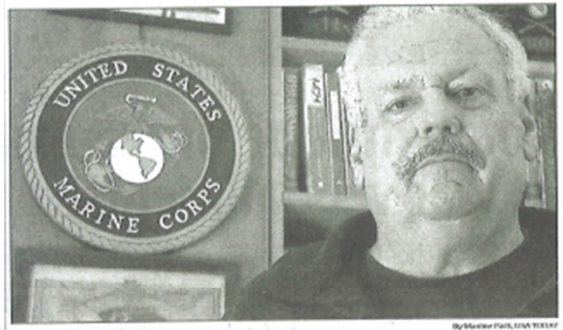
Defense Department doubts claims about toxic dust

ntinued from 1A

eking possible causes.
Despite the research by Lyles and others, and e documented spikes in respiratory illnesses, fense Department officials contend there are health issues associated with the dust.
"The (Defense Department) has examined the concerns raised by the studies accomplished by Capt. Lyles," says Craig Postlewaite, who heads up the Secretary of Defense's Force Readiness and Health Assurance Office. He said the
OVER TORY
litary found the dust is "not noticeably different om samples collected in the Sahara Desert and sert regions in the U.S. and China."
Lyles initially analyzed dust samples from Iraq d Kuwait in 2003 to help determine a way to ep the grit from rendering medical equipment eless.
"When I saw the data, I said, 'Oh my God. This n't be right,' " Lyles says.
Harry Fannin, a chemistry professor at Murray ate University, analyzed the dust for Lyles in late 004.
"It was a little bit unusual," he says, citing high vels of chromium, nickel and other metals.
"You wouldn't see metal like that in the U.S.," he ys, adding he was most concerned about the ny size of the particles. "Any time you have spirable particles, it's bad."
Scientists know fine particulate matter — that naller than 10 micrometers, or about one-fourth e size of a single grain of table salt — can cause ng and respiratory problems.
Catherine Cahill, associate professor at the Geophysical Institute at the University of Alaska, beon collecting airborne dust for the military with he Army Research Lab in Baghdad in 2008.
"I've done sampling since 1986, and I've never een anything that bad — not even in China," she ys, referring to China's extreme levels of pollu on. The everyday fine particulate matter levels in aq were about three times greater than what the PA says is healthy within a 24-hour period, she ys — and those levels should not be exceeded nore than once per year. "We're blowing that tandard out of the water."
She called the abundance of aluminum and lead he found "our worst-case scenarios." Cahill says er research mirrors the work done by Lyles.
"Most things are high is the bottom line," she ays. "I would expect chronic coughs, asthma, espiratory disease in the short term; and (chronic obstructive pulmonary disease), heart problems nd hypertension long-term. Mark's theory, to ne, makes perfect sense."
Lyles' team found almost 150 kinds of bacteria 25% of which may cause diseases such as menin gitis, cystic fibrosis, septic arthritis, gastroenteri is, staph infections, diarrhea and food poisoning.

Defense Department: Not so fast

The Defense Department says it hasn't linke any illnesses among servicemembers to bacteri in the soil.
"All soil, no matter where it is found, has germs present, so this finding is not unusual," Postle waite says. "We have closely examined our med ical surveillance data for those personnel wh have deployed — some multiple times — and w have not been able to identify any increase disease that could be associated with the germs that were identified in the soil."
But Lyles found others who saw anomalies.
Bob Miller, a pulmonologist at Vanderbilt Un versity Medical Center, worked with 101st Ai borne soldiers at Fort Campbell, Ky., after the complained of being short of breath and unable t run as fast as they had before they deployed.
Many had been exposed to a sulfur fire i Mosul, Iraq. They also had been exposed to bur pits — the military disposes of trash at bases i Iraq and Afghanistan by burning as much as 24 tons of it a day in open pits. All of them can through chest X-rays and CT scans with clean bil of health. The soldiers volunteered for a proc dure to obtain lung cell samples, and when Mill examined the biopsies, 50 of 54 showed constri tive bronchiolitis — a rare lung disease that clos the tiniest airways.
Those biopsies also turned up dust.
"A polarizing lens shows sparkling — that's t



By Marine Park, USA TODAY

Victim of a rare flu: Richard Stumbo, 63, was airlifted out of Iraq in 2003 after he came down with a severe case of bronchial pneumonia. Doctors believe it was caused by dust he was exposed to in Iraq.

What Lyles' research team found

Sand is made up of pure silica, but deserts also include minerals that have been deposited by long-gone lakes, ground water, wind and pollution. Navy Capt. Mark Lyles' research team found 37 elements in samples of dust from Iraq and Kuwait, including 15 bioactive metals that are known to cause or have been linked to serious health effects with short- and long-term exposure, according to the Environmental Protection Agency.
Lyles' team measured settled dust, which service-members breathe when it rises into the air during a dust storm. Though the government has standards for air pollution that can contain the following elements, there are no standards for exposures to toxic elements in settled dust. The metals Lyles' team found include:
- **Aluminum** (7,521 parts per million), which causes respiratory infections and lung disease, and has been linked to Alzheimer's, multiple sclerosis and other neurological diseases.
- **Arsenic** (10 ppm), which can cause lung cancer and skin and mucous membrane irritation.
- **Barium** (463 ppm), which can cause breathing problems, heart palpitations, muscle weakness, and heart and liver damage.
- **Chromium** (52 ppm) causes lung cancer and respiratory ailments. Animal tests have shown hexavalent chromium to be extremely toxic when inhaled at any level.
- **Cobalt** (10 ppm) can lead to asthma, pulmonary disease and pneumonia.
- **Lead** (138 ppm) can lead to headaches, nausea, muscle weakness and fatigue.
- **Manganese** (352 ppm) has been linked to metabolic issues, Parkinson's disease and bronchitis.
- **Nickel** (562 ppm) can lead to lung cancer, respiratory issues, birth defects and heart disorders.
- **Tin** (8 ppm), which can cause respiratory problems, depression, liver damage, immune system and chromosomal disorders, a shortage of red blood cells, and brain damage that can lead to anger, sleeping disorders, forgetfulness and headaches, according to the Centers for Disease Control and Prevention.
- **Vanadium** (40 ppm) can cause lung and eye irritation.
- **Zinc** (206 ppm) can cause anemia and nervous-system disorders.

Sources: Mark Lyles, Naval War College; Environmental Protection Agency; Occupational Safety and Health Administration

dust," Miller says. "It is a concern."
He plans to analyze that dust, as well as a brown pigment mixed with it.
"(Lyles) has pretty convincing evidence that the dust is a carrier of toxins," Miller says. "But we need more information before we can make any sweeping generalizations."
Veterans Affairs researcher Anthony Szema found that about 7% of veterans who had deployed to Iraq from 2004 to 2007 had asthma, compared with about 4% who did not deploy. Then he heard about the burn pits, as well as Lyles' theories.
"Lyles gave a lecture in Denver," Szema says. "Everyone's jaw was falling on the floor."
The range of respiratory disease he saw didn't appear to be caused by one problem. And it seems to be getting worse: About 11% of soldiers returning from Iraq have respiratory problems, he says.
Ronnie Horner, chairman of the Department of Public Health Sciences at the University of Cincinnati, saw clusters of servicemembers with *ALS* — or Lou Gehrig's disease — after the 1991 war in Iraq.
ALS affects about 1 to 2 people per 100,000 — usually men older than 55. Half the Desert Storm veterans diagnosed with *ALS* were younger than 25, and 98% were younger than 55.
"We know that aluminum has been associated with ALS, as well as lead," Horner says. "We were definitely interested in Lyles' work."
And early heavy-metal poisoni also look the same as post-traum order (PTSD), he says. "It's all sp says. "But it's very intriguing, es there are such high levels of PTSD."
Former Army specialist Jeremy worked as a mechanic in Baghdad he was still in theater, his hands be if he were nervous. Now the shakin his arms, into his legs and sometim He takes medication to prevent th interfering with his daily life. His numb or tingly, his back hurts and feel weak.
"It all falls under 'neurological si toms,' but nobody knows what "Everything new that comes out — depleted uranium — I think, 'Mayb
Bowman also has troubles brea deployed and must use an inhaler.
Capt. J.A. "Cappy" Surrette, spol Navy Bureau of Medicine and Sur researchers investigated to see wh in Iraq and Afghanistan is toxic. Th record of troops complaining of cer ties unrelated to traumatic brain in
However, he says the Naval H laboratory found that trace met showed levels of toxicity.
"There is no definitive basis to harmful to people or animals," he
However, one Navy study is toxicity of sand from Afghanistar affects cell death, he says. A secon whether Afghanistan dust contr trauma pathology in animals.
Navy Petty Officer 2nd Class Ro 40, of West Fargo, N.D., deployed Iraq, in 2006, and guarded the pe Iraq, in 2008. He began losing wei respiratory problems and migrain with short-term memory loss but in an incident that would have cau brain injury. In June 2010, he had
"My doctors were surprised healthy, active adult," he says. "Th from my unit went through the sa
Dale Griffin, an environmenta microbiologist with the U.S. Ge also found metals and bacteria in
"We know that certain metal says. "I believe there is a risk ther

'It's a very complex problem'

Early in the 2003 Iraq War, a r philic pneumonia — infected 18 servicemembers in Iraq, accordi

study. Researchers theorized that the bacteria entered troops' lungs through the dust or through bacteria picked up from the ground from tobacco in foreign cigarettes.
In 2003, Richard Stumbo worked as a civilian contractor for the Department of the Army when he became sick with a flu so bad he had to be airlifted out of Iraq.
"My doctor said he thought it was some kind of bacteria in the dust that I picked up," Stumbo says. "My boss called me after I got home and told me a couple of the guys had died."
It took Stumbo two months to recover.
Geoff Plumlee, a research geochemist with the U.S. Geological Survey, sifted through dust samples in the aftermath of the World Trade Center attacks in 2001 to determine what in that particulate matter might affect first responders. His work led to legislation meant to take care of people with respiratory problems and cancers who had breathed in the dust.
After looking at Lyles' work, as well as military-sponsored and EPA research, Plumlee said he wants to see more.
"It's a very complex problem," he says. "I think all of the different studies are pointing to a need for a very detailed look."
Richard Meehan, chief of rheumatology at National Jewish Health in Denver, assisted the Army's Public Health Command with a particulate matter study.
National Jewish had received several cases similar to those of Miller's at Vanderbilt, and Meehan began to think it might be more than simply the burn pits. "We wanted to know why we were seeing these rare injuries that Bob Miller was

Scientists: Pentagon misleads on dust-risk study

Say data of health effects to troops in war zones don't support claims

By Kelly Kennedy
USA TODAY

WASHINGTON — The Pentagon is falsely claiming its research shows that airborne dust in Iraq and Afghanistan poses no health risk to U.S. troops, say three scientists whose review of that research found it riddled with mistakes.
Military officials then falsely said the review of their research backed their conclusion that the dust in the two war zones is no different from that in California, scientists Philip Hopke, Mark Utell and Anthony Wexler say.
The scientists, who issued their report last year for the National Research Council (NRC) of the National Academy of Sciences, were part of a team that reviewed a 2008 study at the request of the Pentagon.
The earlier report, which was conducted for the military by the Nevada-based Desert Research Institute, made a series of incorrect conclusions and used faulty research methods, the 2010 study showed.
It is simply not true that research supports the Pentagon's claim that Middle Eastern dust is similar to that in the United States or that it poses no health risks, says Hopke, a Clarkson University scientist who conducted the National Research Council study.
"It's a bit disappointing when they know that, realistically, the data does not support that conclusion," he says.
Both studies were conducted to better understand risks as the number of U.S. troops who served in Iraq and Afghanistan and developed mysterious and severe respiratory conditions skyrocketed after their service. Since the start of the wars in 2003 and 2001, neurological disorders per 10,000 active-duty servicemembers have risen by 251%, while respiratory issues jumped by 47%, according to a USA TODAY analysis of military morbidity records from 2001 to 2010.
In a series of interviews and written memos in recent months, Pentagon health officials have claimed that the 2008 study found nothing wrong with the dust from the Middle East. "It is not noticeably different from samples collected in the Sahara Desert and desert regions in the U.S. and China," Craig Postlewaite, head of the Pentagon Force Protection and Readiness Office, told USA TODAY for a May story.
That USA TODAY report, Postlewaite and other Pentagon officials later said, "attempts to form a 'cause and effect' relationship" but there is "no evidence on which to base such a relationship."
In a blog on the Defense Department's website, Navy Capt. Patrick Laraby cited the NRC study directly: "After an exhaustive review, the NRC was unable to identify any health risks and indicated that they would need more data to determine whether there were any risks," Laraby wrote.

By Kevin Frayer, AP

Thick cover: Marines deal with dust kicked up by a Black Hawk helicopter in May as they rush a colleague wounded from an improvised explosive device in Afghanistan's volatile Helmand province.

Utell, a professor at the University of Rochester School of Medicine who headed the National Research Council study, says it's incorrect for the Pentagon to claim the council's research found "no adverse health effects."
Instead, he says, the 2010 study found there could be negative health effects from the dust and that the 2008 research was so flawed "that they wouldn't be able to determine that with their study."
Utell, Hopke and Wexler, of the University of California-Davis, say their study found that the military's research in the 2008 report was flawed from the beginning, and the council made no statement that the dust is safe or similar to that back home.
In fact, they say the Army's research was so "ill-founded" that it couldn't be used to determine anything other than that the fine particulate matter levels in the Middle East far exceeded recommended World Health Organization levels.
Postlewaite did not respond directly to questions about how he and others represented the two studies. Instead, he said the council praises the military's "ability to carry out such a large-scale exposure-monitoring study in the midst of a military operation."
Johann Engelbrecht, the Desert Research Institute scientist who led the 2008 study, calls the council report "probably a fair judgment" and says he plans to use its recommendations for his upcoming report.
DRI, Engelbrecht says, is independent and was not pressured by the military.

ScienceNews

ttp://www.sciencenews.org/view/generic/id/72020

Home / News / April 23rd, 2011; Vol.179 #9 / Article

Just breathing in Iraq can be hazardous

Poor air quality an added danger to troops

By Rachel Ehrenberg

April 23rd, 2011; Vol.179 #9 (p. 15)

ENLARGE

Dust storms like this one in Baghdad can expose troops to unsafe levels of dust and other particles, air-quality monitoring indicates. Kevin Geisbert

The dirt behind the dust
Published Date: July 10, 2009
By Shaheen Al-Haddad,
Staff writer, Kuwait Times

NavyTimes

ttp://www.navytimes.com/news/2010/07/navy_toxic_dust_071210w/

Study finds toxic metals in dust in Afghanistan

y Andrew Tilghman - Staff writer
osted : Monday Jul 12, 2010 7:41:46 EDT

ere's another thing to worry about when you deploy: toxic dust.

new Navy study suggests that dust from Afghanistan contains metals that may cause espiratory problems and brain damage.

Afghanistan sand produces neurotoxicity ... with potential adverse health effects to our oldiers," according to a briefing of the study presented at a medical conference in June in ortland, Ore.

he Navy conducted the study in response to anecdotal concerns that the dust and dust torms common in the Middle East may be harmful. The dust samples were taken from orward Operating Base Salerno near Khost, which was selected because of its relative solation with no nearby industry that could skew results.

THE WALL STREET JOURNAL.
WSJ.com

HEALTH INDUSTRY | MAY 17, 2011

Troops in Mideast Face Breathing Ills

Burn Pits a Possible Factor as Data Show Higher Rate of Respiratory Woes Among Veterans of Afghanistan, Iraq

By SHIRLEY S. WANG

Veterans who served in Iraq and Afghanistan have a higher rate of debilitating respiratory illness than those deployed elsewhere, according to a new study that bolsters concerns among some medical professionals and members of Congress about the potential harm to troops from toxic chemicals and dust in the Middle East.

The findings, which will be presented Wednesday at the International Conference of the American Thoracic Society in Denver, place renewed urgency on getting at the root of why some young, previously healthy soldiers have been returning from the Middle East complaining of symptoms including shortness of breath and dizziness. In many cases, the soldiers can no longer

oldiers who served in Iraq or Afghanista
gering coughs, shortness of breath, diz
her symptoms. Now, scientists say troo
rved in the Middle East have higher rat
spiratory problems compared to those w
sewhere. WSJ's Shirley Wang reports.

Agence France-Presse/

U.S. soldier from observes an Afghan n
hole to be used as a garbage dump at
abloghay Camp in Zari district of Kandal
ovince.

Not Even Breathing Is Safe in Iraq

By Rachel Ehrenberg, Science News March 31, 2011 | 3:52 pm | Categories: Health

ANAHEIM, California — As if enemy fire, IEDs and suicide bombers weren't enough, U.S. soldiers in Iraq also must contend with air that's laden with heavy metals and lung-ravaging particles, researchers reported March 30 at the spring meeting of the American Chemical Society. Exposure to particles of the size collected in the study is of special concern, because it can lead to chronic respiratory infections, asthma and elevated risk of cardiovascular problems.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Constrictive Bronchiolitis in Soldiers Returning from Iraq and Afghanistan

Matthew S. King, M.D., Rosana Eisenberg, M.D., John H. Newman, M.D., James J. Tolle, M.D., Frank E. Harrell, Jr., Ph.D., Hui Nian, Ph.D., Mathew Ninan, M.D., Eric S. Lambright, M.D., James R. Sheller, M.D., Joyce E. Johnson, M.D., and Robert F. Miller, M.D.

ABSTRACT

BACKGROUND

In this descriptive case series, 80 soldiers from Fort Campbell, Kentucky, with inhalational exposures during service in Iraq and Afghanistan were evaluated for dyspnea on exertion that prevented them from meeting the U.S. Army's standards for physical fitness.

METHODS

The soldiers underwent extensive evaluation of their medical and exposure history, physical examination, pulmonary-function testing, and high-resolution computed tomography (CT). A total of 49 soldiers underwent thoracoscopic lung biopsy after noninvasive evaluation did not provide an explanation for their symptoms. Data on cardiopulmonary-exercise and pulmonary-function testing were compared with data obtained from historical military control subjects.

RESULTS

Among the soldiers who were referred for evaluation, a history of inhalational exposure to a 2003 sulfur-mine fire in Iraq was common but not universal. Of the 49 soldiers who underwent lung biopsy, all biopsy samples were abnormal, with 38 soldiers having changes that were diagnostic of constrictive bronchiolitis. In the remaining 11 soldiers, diagnoses other than constrictive bronchiolitis that could explain the presenting dyspnea were established. All soldiers with constrictive bronchiolitis had normal results on chest radiography, but about one quarter were found to have mosaic air trapping or centrilobular nodules on chest CT. The results of pulmonary-function and cardiopulmonary-exercise testing were generally within normal population limits but were inferior to those of the military control subjects.

CONCLUSIONS

In 49 previously healthy soldiers with unexplained exertional dyspnea and diminished exercise tolerance after deployment, an analysis of biopsy samples showed diffuse constrictive bronchiolitis, which was possibly associated with inhalational exposure, in 38 soldiers.

New-onset asthma among soldiers serving in Iraq and Afghanistan

Anthony M. Szema, M.D.,[1,2] Michael C. Peters, M.D.,[1,2] Kristen M. Weissinger, B.A.,[3] Christy A. Gagliano, M.S.,[1] and John J. Chen, Ph.D.[2]

ABSTRACT

Since June 4, 2004, asthma diagnosed and symptomatic after the age of 12 years has been an exclusion criterion for military

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Original Contribution

Newly Reported Respiratory Symptoms and Conditions Among Military Personnel Deployed to Iraq and Afghanistan: A Prospective Population-based Study

Besa Smith*, Charlene A. Wong, Tyler C. Smith, Edward J. Boyko, Gary D. Gackstetter, and Margaret A. K. Ryan for the Millennium Cohort Study Team

* Correspondence to Dr. Besa Smith, Department of Defense Center for Deployment Health Research, Naval Health Research Center, 140 Sylvester Road, San Diego, CA 92106-3521 (e-mail: besa.smith@med.navy.mil).

Initially submitted November 26, 2008; accepted for publication August 12, 2009.

Concerns about respiratory conditions have surfaced among persons deployed to Iraq and Afghanistan. Data on 46,077 Millennium Cohort Study participants who completed baseline (July 2001–June 2003) and follow-up (June 2004–February 2006) questionnaires were used to investigate 1) respiratory symptoms (persistent or recurring cough or shortness of breath), 2) chronic bronchitis or emphysema, and 3) asthma. Deployers had a higher rate of newly reported respiratory symptoms than nondeployers (14% vs. 10%), while similar rates of chronic bronchitis or emphysema (1% vs. 1%) and asthma (1% vs. 1%) were observed. Deployment was associated with respiratory symptoms in both Army (adjusted odds ratio = 1.73, 95% confidence interval: 1.57, 1.91) and Marine Corps (adjusted odds ratio = 1.49, 95% confidence interval: 1.06, 2.08) personnel, independently of smoking status. Deployment length was linearly associated with increased symptom reporting in Army personnel ($P < 0.0001$). Among deployers, elevated odds of symptoms were associated with land-based deployment as compared with sea-based deployment. Although respiratory symptoms were associated with deployment, inconsistency in risk with cumulative exposure time suggests that specific exposures rather than deployment in general are determinants of postdeployment respiratory illness. Significant associations seen with land-based deployment also imply that exposures related to ground combat may be important.

longitudinal studies; lung diseases; military personnel; signs and symptoms, respiratory

European Neurology

Original Paper

Eur Neurol 2005;53:125–131
DOI: 10.1159/000085556

Epidemiology of Multiple Sclerosis in Kuwait: New Trends in Incidence and Prevalence

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Key Words
Gulf War · Kuwait · Multiple sclerosis · Arab countries

Abstract
The epidemiology of multiple sclerosis (MS) is undergoing dramatic changes; MS is occurring with increased frequency in many parts of the world. In this retrospective study, we examined the changes in incidence and prevalence of MS in Kuwait in the period between 1993 and 2000. We analyzed the records of patients with clinically defined and laboratory supported MS. The total incidence rate increased from 1.05/100,000 population in 1993 to 2.62/100,000 in 2000. The increased incidence of MS was most pronounced among Kuwaiti women (from 2.26/100,000 in 1993 to 7.79/100,000 in 2000. The total prevalence rate increased from 6.68/100,000 in 1993 to 14.77/100,000 in 2000. It was much higher for Kuwaitis (31.15/100,000), as compared to non-Kuwaitis (5.55/100,000), in a complete reversal of the pattern observed before 1990. The prevalence was also higher among Kuwaiti women (35.54/100,000), as compared with Kuwaiti men (26.65/100,000). In conclusion, the incidence and prevalence of MS in Kuwait has increased between the early and late 1990s with no signs of leveling off. In a geographic area that was previously associated with low prevalence, local environmental factors may be responsible for these dramatic changes.

Introduction

Multiple sclerosis (MS) aff
worldwide and it is particularly
sians of northern European des
other races and ethnic populatic
susceptible to MS. For example,
in black Africans and it is gener
The prevalence of MS increases
distance from the equator, excl
Although these geographic diffe
of MS are usually interpreted as b
tal factors, the prevalence gradi
related to genetic susceptibility

Prior to the first Gulf War in
ulation groups in Kuwait were K
A significantly higher prevalenc
Palestinians (23.8/100,000 popu
(9.5/100,000) [2]. The make-u
changed dramatically since the
spect to relative proportion of no
litical reasons, the Palestinians
major expatriate group in Kuwai
by a less homogeneous populat
ethnic minority from the Indian
Arab countries, such as Egypt a
War, a marked increase in MS v
among Kuwaitis. In this study,
trend, to determine whether the
the incidence and prevalence of

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Climate Models Miss Effects of Wind-Shattered Dust

By Lisa Grossman ✉ December 30, 2010 | 2:01 pm | Categories: Physics

Clumps of dust in the desert shatter like glass on a kitchen floor. This similarity may mean the atmosphere carries more large dust particles than climate models assume.

Dust and other airborne particles' effect in the atmosphere is "one of the most important problems we need to solve in order to provide better predictions of climate," said climate scientist Jasper Kok of the National Center for Atmospheric Research in Boulder, Colorado. Other researchers suspect current models also neglect a large fraction of the climate-warming dust that clogs the skies after dust storms.

Potential Pathophysiologies

- *Chemical*
  - *Respiratory distress*
  - *Immune suppression*
  - *Systemic neuropathies*
  - *Other 'toxic' symptoms*
- *Biological*
  - *Respiratory distress and acute inflammation*
  - *Immune suppression with systemic bacteremia*
  - *Acute and chronic systemic effects including neuropathies, cardiovascular events, autoimmune pathologies, etc.*

Collaborators

- *USA Corp of Engineers*
- *Murray State University*
- *Mississippi State University*
- *US Geological Survey*
- *Joint Pathology Center*
- *USAF Toxicology Detachment*
- *Armed Forces Medical Examiners Office*
- *Vanderbilt University*
- *SUNY at Stony Brook*
- *Navy Health Effects Research Detachment*
- *Office of Naval Research*
- *J. Craig Venter Institute*
- *US EPA*
- *University of Alaska at Fairbanks*
- *University of Cincinnati*
- *NASA*
- *University of California at Davis*
- *Chapman University*

The Effects of Microbial Materials Adhered to Asian Sand Dust on Allergic Lung Inflammation

T. Ichinose ; S. Yoshida;K. Hiyoshi ; K. Sadakane ; H. Takano ; M. Nishikawa ; I. Mori ; R. Yanagisawa ; H. Kawazato ; A. Yasuda ; T. Shibamoto. Arch Environ Contam Toxicol (2008) 55:348–357