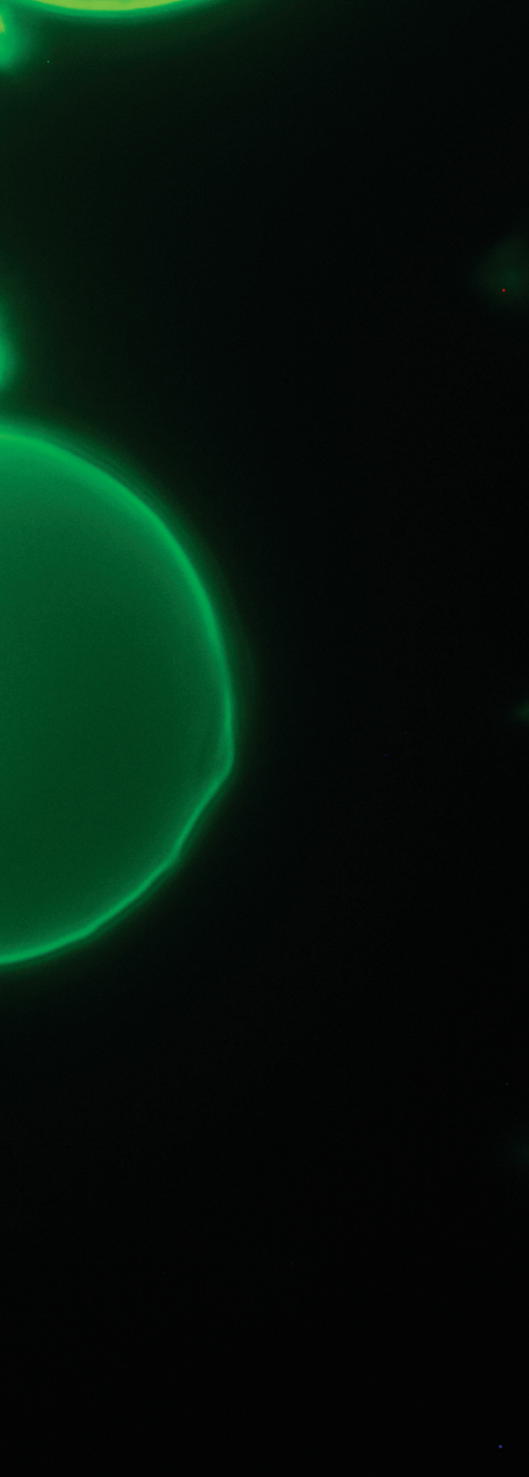


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MIDDLE EASTERN SCIENTISTS TAKE THE LEAD IN RESEARCH ON WORLD'S MOST PREVALENT PROTOZOAL INFECTION

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"Researchers from the Middle East were also the first to genotype *Blastocystis* from IBS and IBD patients"

As such, it may not be surprising that there is little discussion of recent research into *Blastocystis*, a single-celled organism which is the most frequently identified parasite in faecal samples in many areas of the world. Data from a 2007 metastudy of *Blastocystis* research published in BMC Parasites and Vectors suggested that Middle Eastern researchers have contributed the bulk of advanced clinical research into the organism, easily outpacing the United States, Canada, and many European nations combined. So while the US may have the lead in space, Middle Eastern scientists have the lead in the clinical laboratory. Finally, if breaking one stereotype were not enough, most of the scientists heading research efforts in the Middle East are women (see figure 1 on page 26).

The majority of such research has found that infection with the organism will produce diarrhea, and abdominal pain in otherwise healthy individuals. Scientists from the Middle East entered the field of *Blastocystis* in the 1980's, with one of the first large scale studies performed on patients. The research, performed at King Faisal Specialist Hospital in Saudi Arabia and published in the 1989 issue of the Journal of Clinical Microbiology, found that *Blastocystis* produced disease even in the absence of other organisms, and that many patients could be cured with antimicrobial treatment. The research was contested by some US physicians, who suggested *Blastocystis* patients could be diagnosed with "irritable bowel syndrome", a type of chronic gastrointestinal illness characterized by diarrhea, abdominal pain, and other symptoms, and thought to be of non-infectious origin.

In the years following the publication of that study, many Western researchers abandoned microbiological study of "IBS" patients, and delved into the field of alternative medicine and mysticism to explain why these patients developed long-term illness. Middle Eastern researchers followed a classical approach, by examining stool samples from patients and identifying organisms that could be shown to be pathogenic in animal studies. Researchers at Aga Khan University in Pakistan

published a paper identifying *Blastocystis* as an underlying cause of chronic gastrointestinal illness by culturing stool samples from patients as early as 1997. Since then, researchers from a half dozen countries have reported similar findings. This has left Western nations with a problem: the *Blastocystis* infection rate is high in many Western countries, but most of the experts are in the Middle East and Asia. Physicians in the US rely on clinical studies from Turkey, Egypt, and Iran to understand *Blastocystis* infection in their patients.

What factors helped the Middle East take the lead in research? A number of recent advances in medicine have come from rigorous application of the scientific method to disprove medical teachings, which were thought to be infallible, but in fact, had little scientific research to support them. The 11th century Middle Eastern scholar al-Haytham figured this out long ago. In his writing, he believed that human opinion is always fallible, and perfect knowledge can be achieved only through physical experiments. Perhaps the willingness to believe in experimental results over popular opinion gives Middle Eastern researchers an advantage over their Western peers in the sciences. Credited with the development of the scientific method, the influence of al-Haytham's approach spread to Europe centuries later, spurring a revolution in science. Today, we may be seeing a similar revolution in Europe, as researchers need to rethink their belief that many patients will develop chronic gastrointestinal illness due to psychosomatic causes, and that *Blastocystis* infection should be disregarded in those patients. In addition to adhering to the scientific method, Middle Eastern nations appear to have an advantage in their ability to recruit skilled scientists with an understanding of microbiology into ➔

Last June, al-Jazeera sparked a controversy in the United States when they quoted President Obama as saying that NASA, the United States' space agency, should work to "make Muslim nations feel good about their historic contribution to math and science." The comment set off a debate concerning whether the space agency's mission should be targeted to influence specific groups. But the other implication of the quote received little attention, mainly that Muslim nations, most of which are in the Middle East, need guidance from the US. Western news agencies cover few scientific advances coming from the Middle East, although they rarely miss any event that is related to religious extremism.

FIGURE 1: Publication patterns in *Blastocystis* research defy many stereotypes of Middle Eastern nations as lagging in scientific research. Most principal investigators in advanced clinical *Blastocystis* studies from the Middle East are women. The sophistication of studies published on patients with 'IBS' from the Middle East often exceeds that found in Western studies.

Researchers from Turkey have published eight new studies on *Blastocystis* since the start of 2009. These include the first studies to genotype *Blastocystis* from patients diagnosed with irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD).

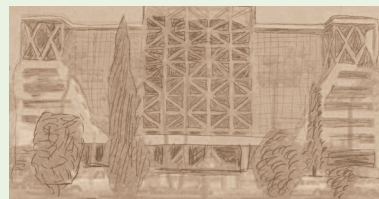
Dr. Laila Nimri of the Jordan University of Science and Technology published the first account of epidemic *Blastocystis* infection in 1993, as well as co-authoring a 1994 study of *Blastocystis* infection in symptomatic and asymptomatic school children in Northern Jordan.



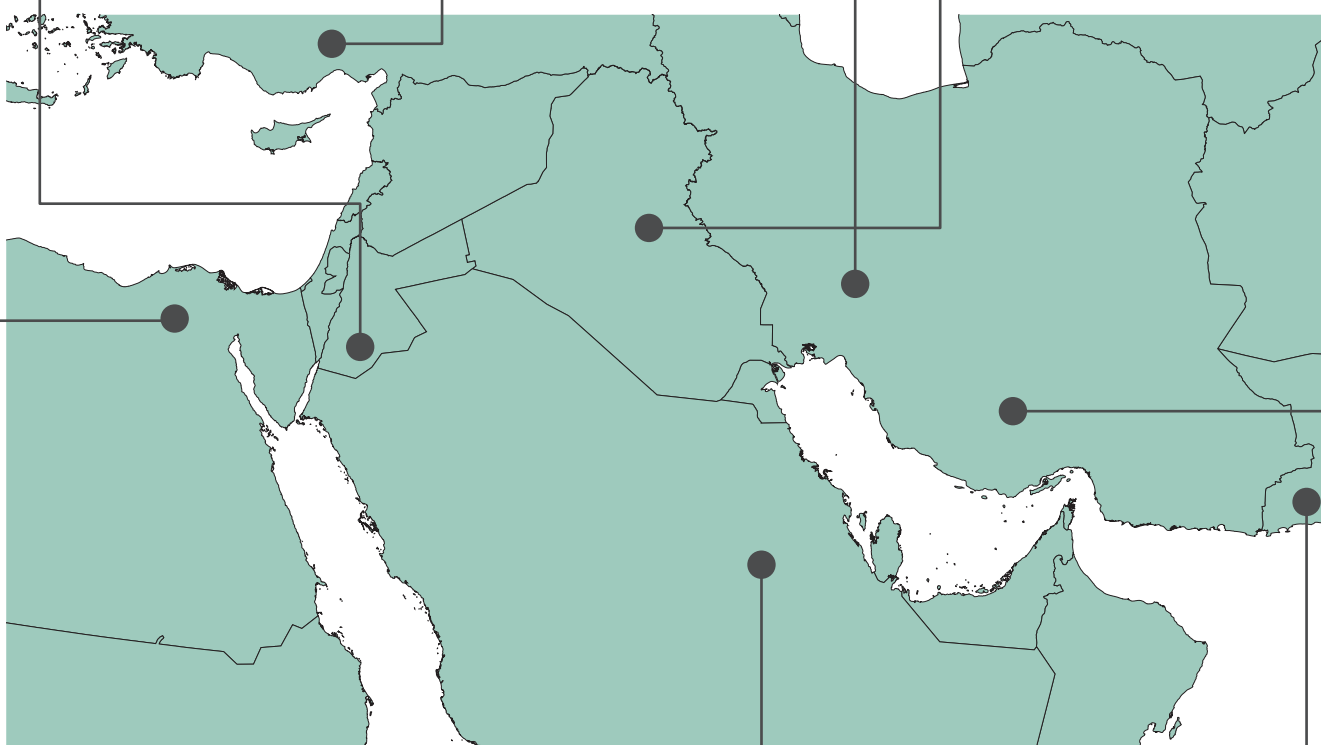
In 2005, researchers at the Isfahan University of Medical Sciences published the first study comparing the success of different drugs in the treatment of *Blastocystis* infection in over 100 patients.



In 2008, at the Shiraz University of Medical Sciences, researchers published study on the genetic diversity of *Blastocystis* isolates from 45 sick patients and healthy controls.



In 1987, researchers at a clinic in Baghdad, Iraq published one of the first treatment studies of *Blastocystis*, describing the diagnosis and treatment of over 100 patients.



In 2010, Professor Hanaa M. Ezzat Moussa of Cairo University co-authored one of the first large phylogenetics studies of *Blastocystis* isolates from the Middle East, in association with the Pasteur Institute in France.



Researchers from King Faisal Specialist Hospital and Research Center in Riyadh published the first large scale study in 1989 suggesting *Blastocystis* infection as the cause of illness in over 200 patients in whom other infections had been excluded.



Reserachers from Aga Khan University in Karachi published one of the first studies in 1987 to suggest that *Blastocystis* infection was responsible for illness in many 'IBS' patients. The paper co-authored by Dr. Baqai (now at the University of Karachi below) studied *Blastocystis* immune response in 56 IBS patients and 36 healthy controls. Today, Dr. Javed Yakoob (shown at the bottom), and other researchers, are continuing studies, recently authoring a paper testing for *Blastocystis* and *Dientamoeba fragilis* isolates in over 300 IBS patients and healthy controls.

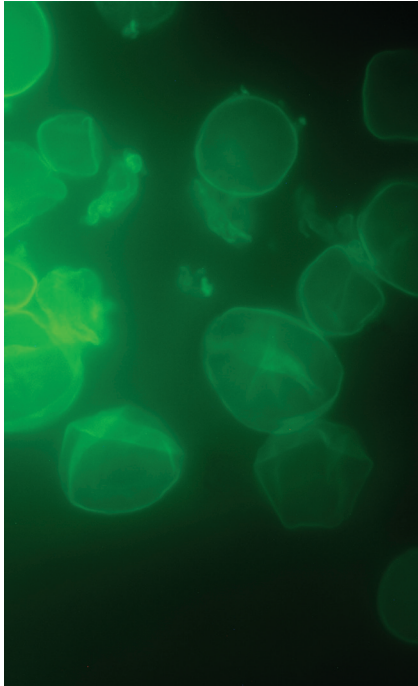


In 2010, researchers from Suez Canal University performed the first study to compare the physiological effects of different strains of *Blastocystis* when introduced into experimental lab animals.



At the University of Karachi, Dr. Rakhshanda Baqai and Syeda Sadaf Haider are studying *Blastocystis* isolates in poultry, as well as those from over 400 patients with chronic diarrhea. The isolates are cultured, genotyped. Serum immune response to *Blastocystis* is examined in patients as well.






the field of gastrointestinal illness, a feat that proves elusive in many Western countries. Western work on IBS patients consists largely of treatment studies and expository

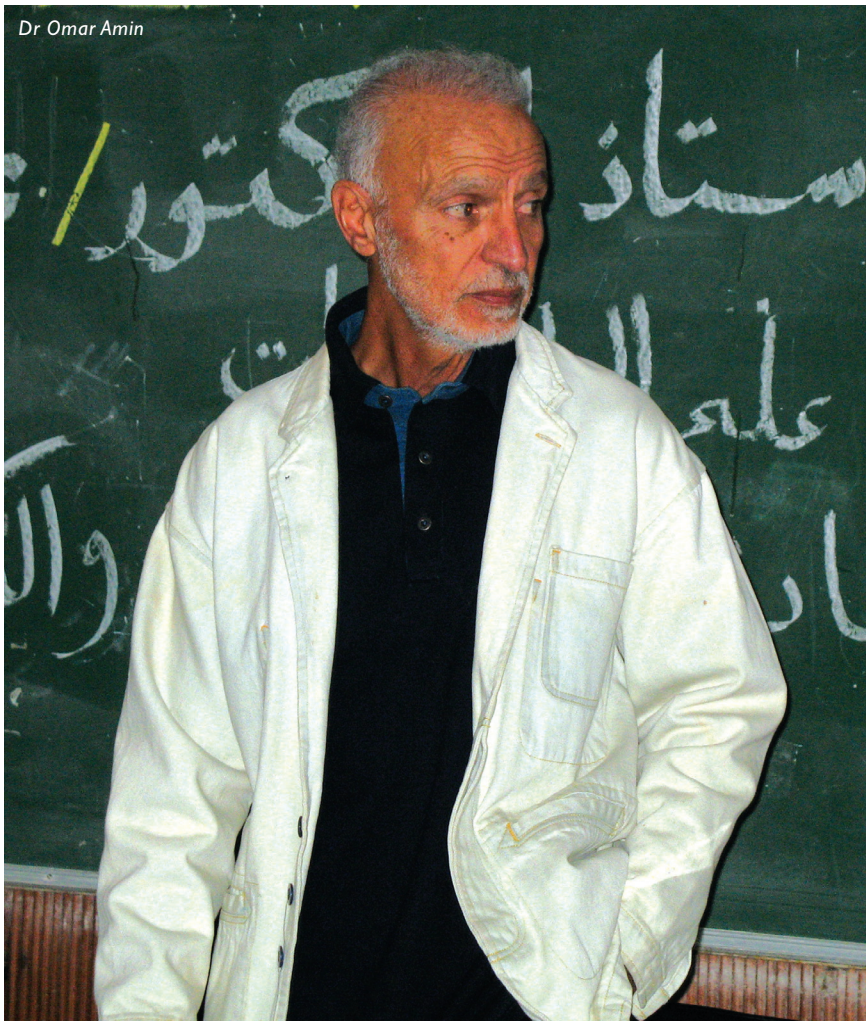
writings on possible causes, with little hard science. In contrast, some of the largest and most sophisticated studies on microbial infection in IBS patients now come from the Middle East. A recent study from Aga Khan University in Pakistan obtained stool samples from over 300 'IBS' patients and controls and used DNA extraction and small-subunit RNA analysis to identify *Dientamoeba fragilis* and *Blastocystis* infection in those patients. Researchers from the region were also the first to genotype *Blastocystis* from IBS and IBD Patients (Gazi School of Medicine, Ankara, Turkey) and to isolate *Blastocystis* from sick patients, genotype it, experimentally infect laboratory animals, and study how the resulting illness varied with *Blastocystis* genotype (Suez Canal University, Egypt).

Outside of the Middle East, Muslims and expatriates from the Middle East and neighbouring countries can be found leading efforts in parasitology and protozoology. Dr. Omar Amin,

"Most of the scientists heading research efforts in the Middle East are women"

originally from Cairo, has previously been a fellow at the US Center for Disease Control, and is now the founder and director of the United States' largest specialty parasitology diagnostic center. Television news stations in Australia recently ran a story on Unaiza Parkar, whose parents are of Indian origin, and who now works at the World Health Organization (WHO) Collaborating Centre for the Molecular Epidemiology of Parasitic Infections at Murdoch University in Australia. She has published *Blastocystis* studies for several years, with her most recent paper using RNA phylogenetics techniques to analyze *Blastocystis* strains found in 41 zookeepers from Australia and Europe. 

Dr Omar Amin



"Medical schools in the Middle East have large departments of Parasitology. Our medical schools in the US barely touch on parasites." Here in the US, we can thank those Middle Eastern schools for educating researchers like Dr. Omar Amin, who today runs the largest specialty parasitology laboratory in the United States, testing thousands of samples yearly from patients in all 50 states in the United States.

*Although North America is relatively free of many vector-borne parasites, parasitic diseases that are transmitted by humans and pets are able to spread as freely as any bacterial or viral infection, even in a developed country. Such diseases include *Trichomonas vaginalis*, *Toxoplasma gondii*, *Cryptosporidium parvum*, *Giardia lamblia*, and of course *Blastocystis*. In 2004, about 1 patient in 7 tested positive for *Blastocystis* infection in the State of Oregon, according to the Oregon Public Health Laboratory. Some southern states, like Texas, have seen the emergence of Chagas disease in their patient populations.*

Dr. Amin notes that "Many in the US do not recognize that parasites even exist in the USA, least of all require treatment. The attitude is: parasites exist only in tropical or third world countries. One MD once told me that he does not believe in parasites."

*In addition to his laboratory work, Dr. Amin has authored a number of papers on the epidemiology of *Blastocystis* infection in the United States.*