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Editorial

Preface to a special issue in memory of Gary Roy Bauchan (1954–2021)

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This issue commemorates the anniversary of Dr. Gary R. Bauchan's passing, on 12 January 2021. Dr. Bauchan, who was one of the victims of the Covid-19 pandemic, will be remembered for the many stunning images that he produced of mites. Mites have suffered from a lack of appreciation, perhaps partly because their small size makes it difficult to see them in detail. His arduous work at the Beltsville Agriculture Research Center has helped to transform the popular representation of mites from obscure creatures to interesting and dynamic organisms that are engaged in complex interactions with their environment. He mainly achieved this by helping to pioneer the use of cryo-scanning electron microscopy on mites (Fig. 1). This is a technique that allows living mites to be frozen in place in order to study their morphology and behavior.

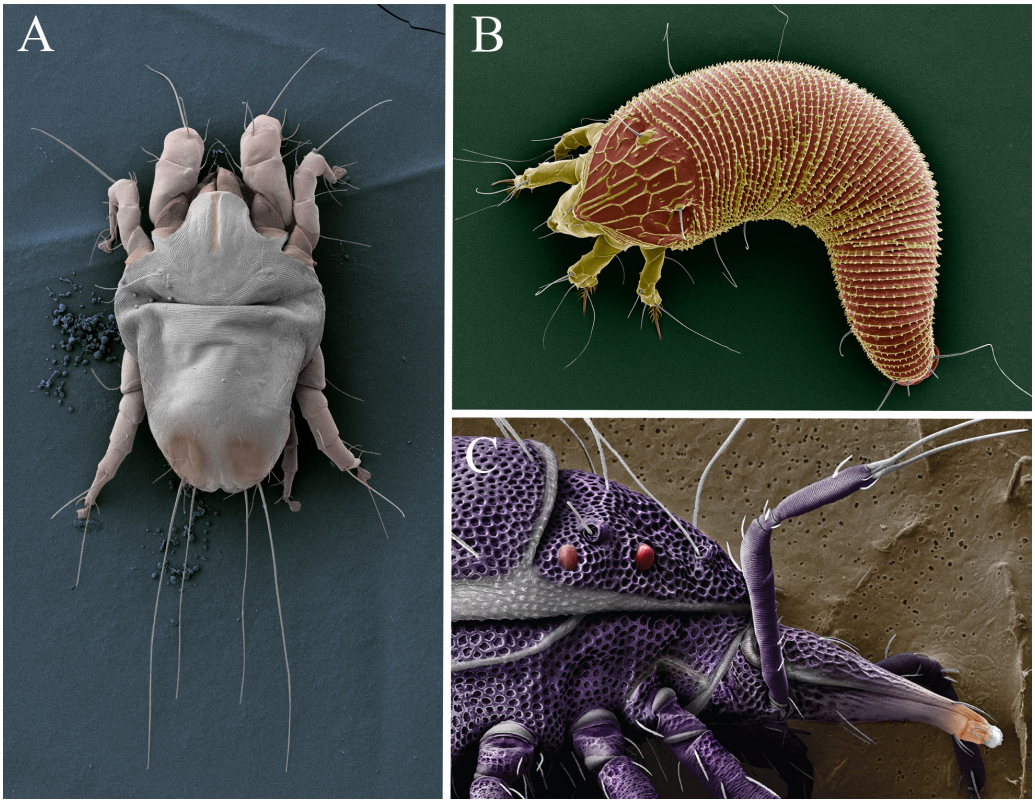


FIGURE 1. SEM images of mites that were taken by Gary Bauchan. A. *Dermatophagoides farina* Bogdanov. B. *Phyllocoptes fructiphilus* Keifer. C. *Trachymolgus purpureus* Fisher & Dowling.

For those who experienced his sense of humor and boundless love for microscopy, Gary's departure has left an unfathomable void. Being in his presence was like riding in a magical roller coaster through clouds of liquid nitrogen mist into a wondrous microcosm. In Dr. Bauchan's Microscopy Unit, every day was an adventure to discover the unknown. He was a dedicated scientist of the Agricultural Research Service (ARS), who worked at Beltsville for 38 years. During that time, he authored and co-authored 253 publications, including 182 peer-reviewed papers in addition to 71 symposium articles, popular press articles, training videos, book chapters and conference abstracts.

Dr. Bauchan, Gary to all he worked with, was born in the scenic natural beauty of East Grand Rapids and raised in Wyoming, Michigan. He received his B.S. Biological Sciences degree in 1976 at Aquinas College, Michigan. In 1978, he obtained his M.S. Plant Sciences from St. Cloud State University, Minnesota and in 1996, his Ph.D. in Plant Cytogenetics and Breeding from his beloved Michigan State University, Michigan.

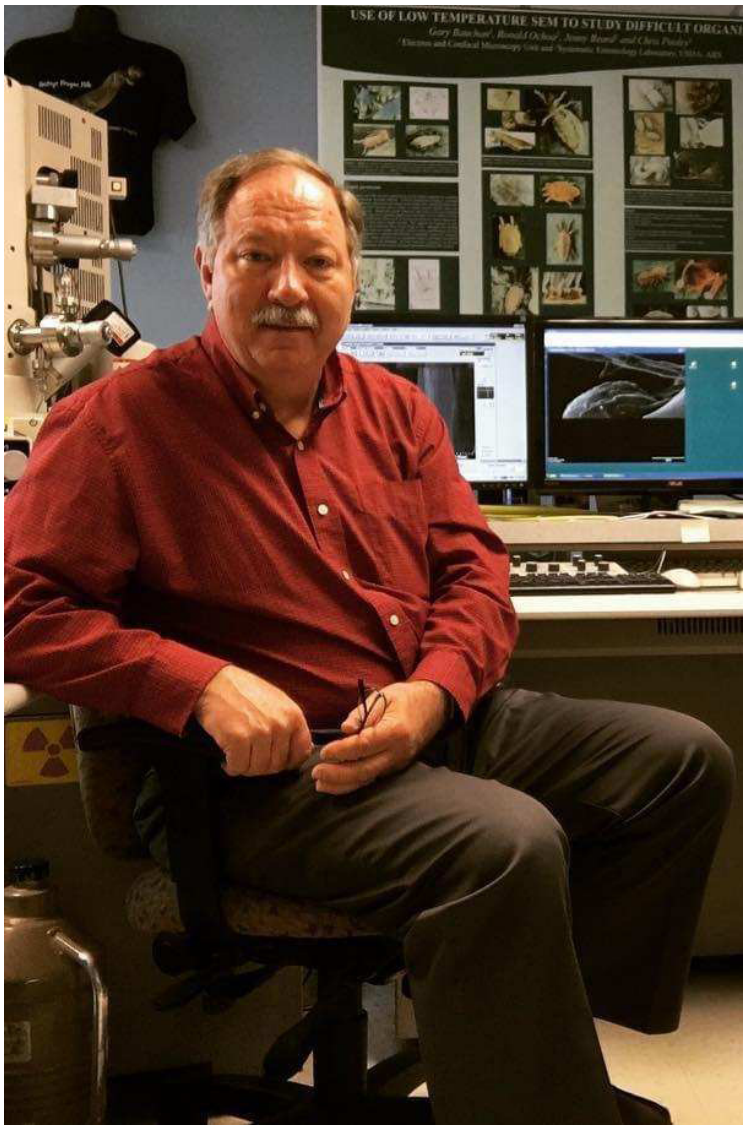
Gary was recognized as a worldwide expert in alfalfa genetics during his first 25 years at ARS. He was elected the President of the North American Alfalfa Improvement Conference in 1992 and served on the conference executive committee from 1988 until 2008. Dr. Bauchan received an Honorary Membership from the North American Alfalfa Conference in 2010 for "Outstanding contributions to the advancement of alfalfa improvement." His research in plant genetics led him into the world of microscopy, and eventually low temperature scanning electron microscopy, to the study of microorganisms.

In 2007, he became the Director of the Electron & Confocal Microscopy Unit (ECMU) in the Soybean Genomics and Improvement Laboratory. In 2012, Dr. Bauchan coordinated the move of the ECMU into a newly renovated, $1.5 million space containing more than $3.5 million of scientific equipment, including state-of-the-art electron transmission and scanning electron microscopes, a confocal laser scanning microscope, wide field fluorescence microscope, and a high-resolution digital video light microscope. Under Dr. Bauchan's leadership, research in the ECMU resulted in 146 scientific articles plus 60 other publications in the past 12 years. During this period, his contributions were key in advancing research impacting a wide range of mites.

Dr. Bauchan and his team worked hand in hand with many different acarologists from around the world, obtained many high quality digital images of mites, which are freely accessible worldwide as identification and educational aids. Through LT-SEM and confocal microscopy, Dr. Bauchan provided new information that has added significantly to the understanding of morphology, behavior, biology, ecology, and the integration of molecular studies with CRYO-SEM morphological data. The websites http://idtools.org/id/mites/flatmites/ and http://idtools.org/id/mites/beemites/ contain many scanning electron micrographs of flat mites and bee mites that are economically important from all around the world. Since it was launched in March 2012, the flat mite web page has had more than 130,000 visitors from 180 different countries and has proved to be an invaluable tool for researchers and regulatory officials from USDA-APHIS who want to identify mites.

Over the past 12 years, Dr. Bauchan participated in more than 200 different research projects at the Beltsville Agricultural Research Center (BARC), interacting with nearly every research unit on campus. He worked with scientists at USDA-APHIS, the National Park Service, Detroit Michigan's Belle Isle Aquarium, the American Museum in New York, the Field Museum in Chicago, States of California, Florida, Maryland, and Oregon Departments of Agriculture, Maryland's Department of Natural Resources, the National Academy of Sciences, the U.S. Geological Survey, and the Smithsonian Institute. He collaborated with scientists at 18 different U.S. universities and from 40 countries. He mentored 20 visiting scientists, 30 post-doctoral scientists, 16 graduate students and 3 undergraduate students. Gary loved teaching, and with his wife Francine, welcomed many of those he collaborated with and mentored into his home throughout the years for dinners and holidays.

Gary had an enormous amount of energy and was driven by insatiable curiosity. His photographs of microscopic organisms were stunning, showing us worlds that seemed too fantastic to be real. He revealed marvels that were previously unknown. His days started with a warm call to many of us telling the Cryo-SEM was running. There was no work he turned down, and there was no collaborator he ever turned away. He had a true passion for science, and he loved to talk about it over a strong cup of good coffee. We will always remember him.



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publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA; USDA is an equal opportunity provider and employer.

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