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## John A. Davidson: Coccidologist, Artist, Teacher and Naturalist

### ABSTRACT

Dr. John Davidson was honored at the XIV International Symposium on Scale Insect Studies with the Career Achievement award for his outstanding research on scale insects, particularly armored scales. His contributions with colleagues and students include a comprehensive treatise on the economic armored scale insects of the United States, and a series of taxonomic works on armored scales in the genera *Abgrallaspis*, *Crenulaspidiotus*, *Hemigymnaspis*, *Melanaspis*, and *Pseudischnaspis*. He is best known for his detailed line drawings and beautiful color photographs. Research of his laboratory has emphasized the biology of the species studied including life history information on more than 20 species. He has undertaken pioneering research using integrated pest management strategies to develop the first arborist and nursery IPM programs. In ornamental landscapes he was among the first to test and promote summer oils for the control of armored scales. As a teacher, he taught courses in such diverse subjects as introductory entomology, systematics, insect taxonomy, insect morphology, parasitology, medical and veterinary entomology, coccidology, acarology, insect pests of ornamental plants, scientific illustration, ornithology, and human histology. He received high accolades from his students and was a member of more than 20 graduate committees in addition to serving as major professor to 10 graduate students in coccidology and acarology. John is a true naturalist and is knowledgeable of botany, general entomology, ichthyology, ornithology, herpetology, and acarology. He is well known for his sense of humor and his probing interest in science.

John Davidson is a generalist and a true naturalist, part of a dying breed these days. He was born in Elizabeth New Jersey, July 26, 1933, received his BA in biology at Columbia Union College in 1955 and his MS and PhD in entomology at the University of Maryland in 1957 and 1960 respectively. His major professor was Harold McConnell who died three months after John received his master's degree. John's master's research was unusual; when he began graduate school he knew nothing about scale insects and Harold McConnell decided he should learn to collect, mount, and identify all of the scale insects found on the campus of the University of Maryland. He then developed a key to the 12 families and 44 genera discovered there. His PhD was a revision of the armored scale genus *Abgrallaspis* including host transfer work to evaluate host influence on morphological characters. Harold Morrison of the United States Department of Agriculture provided guidance in this research.

Since completing graduate school, John's work has concentrated on armored scales, but he also has published peer reviewed papers on soft scales (Gimpel *et al.*, 1974) and

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Fig. 1 - John Davidson wearing the shirt with his illustration of *Melanaspis obscura* that was given to participants at the ISSIS meeting in his honor.

kermesids (McConnell & Davidson, 1983). One of his most important contributions is his 2005 book on the economic armored scales of the United States (Miller & Davidson, 2005). Although it is limited in geographic scope, it covers a high percentage of the economically important diaspidids of the world. It is unique, as was pointed out by Chris Hodgson, as one of a few, if not the only, coffee-table books in the field of coccidology. John was heavily involved in all aspects of the research but it is his color photographs and detailed line drawings that make it a landmark publication. For the line drawings, he spent considerable time and effort accurately illustrating details of the microducts, prepygidial structures and sclerotization patterns in addition to the more traditional characteristics of lobes, pores, and macroducts. Only a high quality illustrator could portray the subtle patterns and intricate shading of these delicate structures. He and Ray Gill produced the majority of the color plates with images taken using cameras attached to a dissecting microscope. The images are even more impressive when you realize that they were taken before the introduction of automontage technologies.

Family/Species name	author	Citation	notes
DIASPIDIDAE			
<i>Aspidiotus cryptomeriae</i>	Kuwana	Stoetzel & Davidson, 1974	Original observations
<i>Aspidiotus nerii</i>	Costa	Stoetzel & Davidson, 1974	Original observations
<i>Chionaspis myssae</i>	(Comstock)	Knipscher <i>et al.</i> , 1976	Original observations
<i>Comstockaspis perniciosae</i>	(Comstock)	Davidson, 1975a	Compilation of literature
<i>Diaspidiotus ancylus</i>	(Putnam)	Stoetzel & Davidson, 1974 Polavarapu <i>et al.</i> , 2000	Original observations
<i>Diaspidiotus liquidambaris</i>	(Kotinsky)	Stoetzel & Davidson, 1974	Original observations
<i>Diaspidiotus mcombi</i>	McKenzie	Stoetzel & Davidson, 1974	Original observations
<i>Diaspidiotus osborni</i>	(Hunter)	Stoetzel & Davidson, 1974	Original observations
<i>Fiorinia externa</i>	Ferris	Davidson & McComb, 1958	Original observations
<i>Hemiberlesia ithacae</i>	(Ferris)	Stoetzel & Davidson, 1974	Original observations
<i>Hemiberlesia lataniae</i>	(Signoret)	Stoetzel & Davidson, 1974	Original observations
<i>Hemiberlesia neodiffinis</i>	Miller & Davidson	Stoetzel & Davidson, 1974	Original observations
<i>Lepidosaphes ulmi</i>	(Linnaeus)	Davidson & Wood, 1974	Compilation of literature
<i>Melanaspis obscura</i>	(Comstock)	Stoetzel & Davidson, 1971, 1973	Original observations
<i>Pseudaulacaspis pentagona</i>	(TargioniTozzetti)	Davidson <i>et al.</i> , 1983	Original observations
<i>Pseudaulacaspis prunicola</i>	(Maskell)	Davidson <i>et al.</i> , 1983	Original observations
<i>Unaspis enonymi</i>	(Comstock)	Gill <i>et al.</i> , 1982	Original observations
KERMESIDAE			
<i>Kermes pubescens</i>	Bogue	McConnell & Davidson, 1959	Original observations
COCCIDAE			
<i>Ceroplastes ceriferus</i>	(Fabricius)	Gimpel & Davidson, 1969	Original observations
<i>Eulecanium cerasorum</i>	(Cockerell)	Davidson, 1975b	Compilation of literature
<i>Toumeyella liriodendri</i>	(Goeze)	Davidson, 1975c	Compilation of literature

Other contributions to taxonomic coccidology include revisions with students and colleagues on armored scales in the genera *Abgrallaspis* (Davidson, 1964), *Melanaspis* (Deitz & Davidson, 1985), *Crenulaspidotus* (Miller & Davidson, 1981), *Hemigymnaspis* (Davidson & Miller, 1977), and *Pseudischnaspis* (Miller *et al.*, 1984), and on the soft scale genus *Ceroplastes* (Gimpel *et al.*, 1974). He described 21 species and 1 genus new to science and colleagues have described 1 genus *Davidsonaspis* (Normark *et al.*, 2014) and 1 species *Aathococcus davidsoni* (Miller & Miller, 1993) in his honor.

John has always placed special emphasis on understanding the biology of scale insects, particularly armored scales, and he and his graduate students worked out the life history of more than 20 species (Table 1). In collaboration with Dick Knipscher, they were the first to demonstrate that an armored scale feeding on leaves had a consistently different morphology than the same species feeding on bark (Knipscher *et al.*, 1976). In the case of the armored scale in their experiments (*Chionaspis myssae*

(Comstock)) the two forms had even been placed in different genera (*Chionaspis* Signoret [bark form] and *Phenacaspis* Cockerell [leaf form]). Previous to that time, there had been anecdotal evidence that leaf and bark dimorphism was the case, but this study provided definitive evidence. In life-history studies with his graduate student Manya Stoetzel they worked out the life cycles of eight species of armored scales and one of the more important discoveries was that they were able to distinguish female and male first-instar nymphs of aspidiotines based on the setal pattern on the abdominal dorsum. They also were able to show that the obscure scale *Melanaspis obscura* (Comstock), which is a serious pest of oaks in the eastern United States, develops asynchronously on white oaks and pin oaks (Stoetzel & Davidson, 1973). This was important information for development of control strategies and showed that populations on each host are reproductively isolated.

John has been involved in the organization of several meetings of students and colleagues interested in scale insects. He was in charge of 5 coccidology short courses held on the campus of the University of Maryland from 1974 to 1987. Attendees were primarily from the United States, but some came from as far away as New Zealand. The focus was on classification and identification, but there also were lectures on collecting, specimen preparation, life history, and control. Instructors included Dick Wilkey, Michael Kosztarab, Mike Williams, Paris Lambdin, Ray Gill, Steve Nakahara, Avas Hamon, dug Miller, and John Davidson. John also was heavily involved in scale insect identification workshops held at National and Branch meetings of the Entomological Society of America (ESA) and he organized and moderated a symposium at a national meeting of ESA in Chicago in 1969 on recent advances in coccidology. He gave a week-long short course on scale insects at Cornell University as part of the Griswold Lecture series in 1975. He was honored at the Sternorrhyncha Session at ESA in 1996 for his contributions to entomology. He further was a coorganizer of the precursor to the International Symposium on Scale Insect Studies, which was a symposium held during the 1976 International Congress of Entomology in Washington, D. C. (Kosztarab *et al.*, 1977).

Beyond the more traditional areas of taxonomy and life history, John was involved in pioneering research in the area of integrated pest management (IPM) particularly of scale insects in the United States. IPM was an active area of agricultural crop pest research but had not been used by arborists, nurseries, or landscapers. This was no simple matter, since monitoring pests and treating them in large agricultural fields is very different from monitoring and implementing control strategies in diverse private and commercial settings. In collaboration with graduate students he developed the first IPM programs for arborists and nurseries. He developed a week long short course on pest management in the urban ornamental environment and published a book on the subject with Mike Raupp (Davidson & Raupp, 2014). This course continues to attract

landscape managers from all over the USA. The only first-hand information that we have on the impact of landscape IPM is on the campus of the University of Maryland during the short courses mentioned above. During these courses we spent several afternoons collecting and mounting the scale insects that we harvested on campus. For the first few years we located infestations of over 50 species of scale insects and had very little trouble finding them. However, in the early 1980's as part of his research, John convinced the University of Maryland pest control staff to implement IPM strategies. By the time the final short course was given in 1987 it was difficult to locate even 15 species on campus. By eliminating indiscriminate, broad-cast spraying of pesticides, the natural enemies flourished and reduced the scale insect populations to such low levels, that it was difficult to detect them.

As an expert on scale-insect life history, John also was important in establishing the timing for treating armored scales when they were in the crawler stage and most susceptible. At the time, dormant oils were used for the control of various scale groups, but especially armored scales. He was a pioneer in research using lighter summer oils that could be sprayed during any season and also began using combinations of pesticides and various formulations of horticultural oils as new strategies for scale insect control.

During his teaching career, John taught 12 different courses including introductory entomology, systematics, insect taxonomy, insect morphology, parasitology, medical and veterinary entomology, coccidology, acarology, insect pests of ornamental plants, scientific illustration, ornithology, and human histology. He was highly regarded by his students and presented such an exciting and interesting perspective to introductory entomology that he stimulated William Gimpel to change his major from agricultural economics to entomology. There undoubtedly are other examples of the impact of his teaching prowess. John served as the major advisor for 10 graduate students and was on more than 20 graduate student committees during his career. As an Extension Entomologist part of his mission was to provide research results to the user community. In this regard he gave more than 170 lectures to organizations such as master gardeners, Christmas tree growers, arborists, nursery managers, landscape managers, home gardeners, and garden clubs.

We alluded to the fact that John has very diverse biological interests outside of coccidology. He is knowledgeable of botany, general entomology, ichthyology, ornithology, herpetology, and acarology. Until he was incapacitated by a stroke in 1990, he was an avid backyard basketball player and gardener, and perhaps one of his greatest passions is fishing. He is one of those unique people who has a special rapport with the fish. He can put his line in a bucket and still catch fish.

John retired from the University of Maryland in 1994 after serving on the faculty for 28 years; but this was retirement in name only. For many years he continued to go to “work” nearly every day. After retirement he completed the armored scale book in 2005, published 4 additional peer-reviewed papers (Miller & Davidson, 1998; Miller *et al.*, 2006, Miller *et al.*, 2006, Gordon & Davidson, 2008), and coauthored two extensive landscape IPM manuals (Krischik & Davidson, 2004; Davidson & Raupp, 2014). He continues to make significant contributions to the faculty and students in the Department of Entomology as a mentor with an historical perspective. He reads extensively and enjoys keeping abreast of the most recent discoveries in science and uses his knowledge to challenge colleagues in rigorous conversation. He especially enjoys having these discussions accompanied by his drink of choice, i. e., a Manhattan.

He also enjoys telling jokes. He can always make people laugh, sometimes even when the joke isn’t all that funny. He is well known for forgetting the punchline of a joke. However, it really doesn’t matter, because as he anticipates the end of the joke he starts laughing with such vigor and contagion that everyone else joins in the folly even without the punchline. He eventually began writing a reminder in the calendar that he always carries with him, and if he can’t remember the end of a joke, he can find it in his book. This often is done while wiping away tears caused by all of the laughter.

It has been an honor and pleasure to work with John for nearly 50 years. His contributions to scale insect taxonomy, life history, and control are truly remarkable and clearly warrant recognition by the governing body of the International Symposium on Scale Insect Studies as a recipient of the Career Achievement Award.

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