PATTERSON, G. 2004. The Mosquito Wars. A History of Mosquito Control in Florida. University Press of Florida; Gainesville, xviii + 263 pp. ISBN 0-8130-2720-9. Hardback. $55.00.

Florida was among the last of the states to be populated widely by humans. Some people deemed it uninhabitable because of its insufferable mosquito populations.

Here is explained how focused mosquito control in Florida solved the problems of the major mosquito-borne diseases malaria (transmitted by *Anopheles* mosquitoes), yellow fever, and dengue (transmitted by *Aedes aegypti* only) by the mid 20th century. This was done under the auspices of Florida's Board of Health, later Department of Health [DH]. The pest problem caused by the teeming populations of saltmarsh mosquitoes (*Ochlerotatus taeniorhynchus* and *O. sollicitans*) took even greater effort, lasting for decades and still ongoing. While saltmarsh mosquitoes were being battled, many new residents decided that Florida's coasts were the place to live, and they now expected a mosquito-free environment. It is alleged that mosquito control made possible the USA's space program at Cape Canaveral, adjacent to saltmarshes. Mosquito control districts (for which taxes were paid) were established in many Florida counties. Their charge was more to control pest mosquitoes (pest control) than to control mosquito-borne diseases (health), but the boundaries were not clear.

If you think that all of this was beneficial, then think again. The only realistic way to control saltmarsh mosquitoes (which do not transmit diseases to humans and are 'merely' horrendous pests) was to apply chemicals, or to change the character of the marshes by filling, impounding and flooding, or draining them. Those marshes are the cradle of Florida's offshore fisheries, and are immensely productive. The conflict between those who would maintain the marshes in their natural state, and those who wanted mosquito control at all costs led to a multi-way political fight. Many coastal residents wanted mosquito control at any cost, whatever it took, and they had political clout because they were numerous. Some mosquito control districts (southwest coast) would give it to them by applying chemicals—but of course they ran afoul of the fishing industry and environmentalists, and then of Florida's DNR (Department of Natural Resources, later incorporated into Florida's DEP, Department of Environment Protection). Other mosquito control districts (east coast) would give it to them at first by canalling to drain the marshes, and later by impounding sections of them and flooding the impoundments to prevent saltmarsh mosquito oviposition. This, concept, too, ran afoul of Florida's DNR which would rather have the natural function of the saltmarshes fully restored. Florida's Game and Freshwater Fish Commission, contrarily, viewed flooding of impounded marshes as beneficial, because it promoted populations of ducks, other forms of "wildlife" being of little interest to it. Developers would rather drain the marshes and build condominiums and other housing on them, no matter that this would trash the east coast method of controlling saltmarsh mosquitoes, make chemical control the only way of protecting the human population from these biting pests, and destroy the offshore fishing industry. Developers, too, have a political lobby. Oh, what a fight!

In the late 1950s, additional diseases, transmitted by *Culex* mosquitoes began to arrive in Florida. They were St. Louis encephalitis, eastern, western and Venezuelan encephalitides. People, horses and birds, died from these diseases. The diseases would flare up here and there, and be difficult to study because they were not constantly present. Funding for disease-carrying mosquito control was increased at major flareups, and died between them when urgency was not apparent to politicians. These new diseases were not transmitted by *Aedes*, *Anopheles*, or *Ochlerotatus* mosquitoes, and did not live in saltmarshes, requiring other kinds of control methods. Much more recently, West Nile virus arrived, also transmitted mainly by *Culex* mosquitoes. The attitude of a large segment of the public, especially along the coasts, is that chemical pesticides must be applied to kill mosquitoes (any mosquitoes, because the general public does not understand the differences). However, a growing segment of the public is aghast at profligate use of chemical pesticides which they know kill non-target organisms and threaten human health. Again, the problem is political.

Politics determined the level of mosquito control. In 1964-1969, a U.S. Public Health Service campaign (in conjunction with other campaigns in the Americas) was concocted to eradicate *Aedes aegypti* (vector of yellow fever and dengue) from the USA. Florida became a battleground although it no longer had either of these diseases. The campaign in Florida failed through poor planning and execution and caused ill-will through 'invasion' of private property.

Politics caused absorption of the Florida Department of Health [DH] into the Florida Department of Health and Rehabititative Services [DHRS]. This caused great dissent between medicine and rehabilitative services. Mosquito control and research, the child of DH, became virtually orphaned. Along with politics came the major human participants and their views about mosquito control, which were rapidly politicized. Jack Rogers, eventually 'state entomologist' on behalf of DHRS, thought chemicals were the ultimate answer to mosquito control despite anything that Rachel Carson wrote. Wayne Miller, director of the

Lee County Mosquito Control District, also believed in chemicals (although he supported some applied research), and countered mosquitoes by buying more planes and helicopters, and spraying more chemicals, until his airforce exceeded that of most Central American countries. Jackie Salmela and John Beidler (Brevard County and Indian River County mosquito control directors respectively) believed that impounding and flooding sections of saltmarsh should be the main way to control saltmarsh mosquitoes. Herb Kale, future president of the Florida Audubon Society, demonstrated that purple martins, beloved of the fringe element with quackish cures for mosquito control, did nothing worthwhile to control mosquitoes. John Mulrennan Sr. fought for funding for mosquito control (and research) and set the scene for what happened next. John Mulrennan Jr., a retired naval man, somehow inherited his father's position as director of the DHRS Office of Entomology and imposed a new director on a breakaway laboratory (next paragraph). Elton Gissendanner, administrator of Florida's Department of Natural Resources (later absorbed into Florida's Department of Environmental Protection) was horrified by the cavalier attitudes of some of the foregoing, and wanted to stop mosquito control. However, Florida's laws on pesticide use related to agricultural chemicals, not those used for mosquito control. Ultimately, the Office of Entomology was transferred from DHRS to FDACS (Florida Department of Agriculture and Consumer Services) where pesticide use is regulated.

The hero in this story is Maurice Provost, an environmentalist who was involved in the early control of *Anopheles* mosquitoes to control malaria. He was the founding director of the DH [later DHRS] Entomological Research Center [ERC, later Florida Medical Entomology Laboratory, FMEL] in Vero Beach. This laboratory was dedicated to basic (and applied) research into mosquitoes and some other biting flies. He sponsored research into mosquito ecology, behavior, and physiology and he ran headlong into Jack Rogers (promoted to his superior instead of his inferior by DHRS). Under Rogers, the use of chemical pesticides should prevail, and advocacy research should be the *modus operandi* of FMEL. Provost would have none of it. Provost believed that impoundments in saltmarshes could be managed to maintain their productivity for offshore life **and** to control mosquitoes, with use of chemicals against adult mosquitoes only on the occasions when control of the immature stages in the marshes failed. Provost was assailed now from the highest levels of DHRS with prompting from Rogers. The result was the cutting of the FMEL budget to the bone or worse by DHRS, and an embargo on its Federal research grants. DNR did nothing to support Provost. Dale Patchett, Florida state representative in Vero Beach, suggested a legislative move to transfer FMEL administratively from DHRS to the Institute of Food and Agricultural Research [IFAS] of the University of Florida.

One Saturday morning in 1977, Maurice Provost called a meeting of his senior researchers and explained to them what was afoot. He asked for a vote of confidence to transfer FMEL to IFAS. He explained that this would be considered mutiny against DHRS and might well lead to repercussions. His call for a vote yielded a universal **yes**. The move to transfer FMEL to the University of Florida failed in the first bill presented by Dale Patchett. There followed a 2-year virtual 'war' with the DHRS administration that opposed the transfer. During that war, Maurice was the first casualty: he died of a heart attack in 1977, on the Sunday after Thanksgiving. Two researchers, Bill Bidlingmayer and George O'Meara, valiantly stepped in successively as interim directors. After that, affairs went further downhill.

This book is a tremendous read. It gets deeply into the contorted politics of mosquito control, Florida's environment, and the personalities involved. I recommend it highly.

I was involved in this story because I was one of Maurice Provost's senior researchers who voted **yes** that Saturday morning in 1977. A colleague discovered that two of our peers were "ratting" behind the backs of the others to kept the DHRS administration informed; this poisoned collegial relationships for years, and they remained poisoned long after the bill was passed and transfer was accomplished. This book does not delve deeply into the events of the mutiny, the repercussions, and the aftermath. Perhaps these things are still too raw in the memories of the living participants. Instead, the book presents much information about fascinating events and personalities and politics in the early decades of the 20th century, which otherwise might have been forgotten, and these are its strength.

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