War Evolves With Drones, Some Tiny as Bugs

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A microdrone during a demo flight at Wright-Patterson Air Force Base. More Photos »

By ELISABETH BUMILLER and THOM SHANKER
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WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Two miles from the cow pasture where the Wright Brothers learned to fly the first airplanes, military researchers are at work on another revolution in the air: shrinking unmanned drones, the kind that fire missiles into Pakistan and spy on insurgents in Afghanistan, to the size of insects and birds.

The base's indoor flight lab is called the "microaviary," and for good reason. The drones in development here are designed to replicate the flight mechanics of moths, hawks and other inhabitants of the natural world. "We're looking at how you hide in plain sight," said Greg Parker, an aerospace engineer, as he held up a prototype of a mechanical hawk that in the future might carry out espionage or kill.

Half a world away in Afghanistan, Marines marvel at one of the new blimplike spy balloons that float from a tether 15,000 feet above one of the bloodiest outposts of the war, Sangin in Helmand Province. The balloon, called an aerostat, can transmit live video — from as far as 20 miles away — of insurgents planting homemade bombs. "It's been a game-changer for me," Capt. Nickoli Johnson said in Sangin this spring. "I want a bunch more put in."

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Drones Transform How America Fights Its Wars

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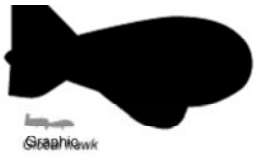

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From blimps to bugs, an explosion in aerial drones is transforming the way America fights and thinks about its wars. Predator drones, the Cessna-sized workhorses that have dominated unmanned flight since the Sept. 11, 2001, attacks, are by now a brand name, known and feared around the world. But far less known is the sheer size, variety and audaciousness of a rapidly expanding drone universe, along with the dilemmas that come with it.

The Pentagon now has some 7,000 aerial drones, compared with fewer than 50 a decade ago. Within the next decade the Air Force anticipates a decrease in manned aircraft but expects its number of "multirole" aerial drones like the Reaper — the ones that spy as well as strike — to nearly quadruple, to 536. Already the Air Force is training more remote pilots, 350 this year alone, than fighter and bomber pilots combined.

"It's a growth market," said Ashton B. Carter, the Pentagon's chief weapons buyer.

The Pentagon has asked Congress for nearly $5 billion for drones next year, and by 2030 envisions ever more stuff of science fiction: "spy flies" equipped with sensors and microcameras to detect enemies, nuclear weapons or victims in rubble. Peter W. Singer, a scholar at the Brookings Institution and the author of "Wired for War," a book about military robotics, calls them "bugs with bugs."

In recent months drones have been more crucial than ever in fighting wars and terrorism. The Central Intelligence Agency spied on Osama bin Laden's compound in Pakistan by video transmitted from a new bat-winged stealth drone, the RQ-170 Sentinel, otherwise known as the "Beast of Kandahar," named after it was first spotted on a runway in Afghanistan. One of Pakistan's most wanted militants, Ilyas Kashmiri, was reported dead this month in a C.I.A. drone strike, part of an aggressive drone campaign that administration officials say has helped paralyze Al Qaeda in the region — and has become a possible rationale for an accelerated withdrawal of American forces from Afghanistan. More than 1,900 insurgents in Pakistan's tribal areas have been killed by American drones since 2006, according to the Web site www.longwarjournal.com.

In April the United States began using armed Predator drones against Colonel Muammar el-Qaddafi's forces in Libya. Last month a C.I.A.-armed Predator aimed a missile at Anwar al-Awlaki, the radical American-born cleric believed to be hiding in Yemen. The Predator missed, but American drones continue to patrol Yemen's skies.

Large or small, drones raise questions about the growing disconnect between the American public and its wars. Military ethicists concede that drones can turn war into a videogame, inflict civilian casualties and, with no Americans directly at risk, more easily draw the United States into conflicts. Drones have also created a crisis of information for analysts on the end of a daily video deluge. Not least, the Federal Aviation Administration has qualms about expanding their test flights at home, as the Pentagon would like. Last summer, fighter jets were almost scrambled after a rogue Fire Scout drone, the size of a small helicopter, wandered into Washington's restricted airspace.

Within the military, no one disputes that drones save American lives. Many see them as advanced versions of "stand-off weapons systems," like tanks or bombs dropped from aircraft, that the United States has used for decades. "There's a kind of nostalgia for the way wars used to be," said Deane-Peter Baker, an ethics professor at the United States Naval Academy, referring to noble notions of knight-on-knight conflict. Drones are part of a post-heroic age, he said, and in his view it is not a always a problem if they lower the threshold for war. "It is a bad thing if we didn't have a just cause in the first place," Mr. Baker said. "But if we did have a just cause, we should celebrate anything that allows us to pursue that just cause."

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