

Air and Space this Week

Item of the Week

A Balloon Bomb at Gearhart Mountain: The Only Civilian Deaths of WWII on the USA Mainland

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The Japanese had suffered a severe loss-of-face when the B-25's led by Jimmy Doolittle bombed Tokyo and other mainland targets in early 1942. But they could not reply in kind in a meaningful way. They managed a few desultory shelling of shore facilities by submarines, and tried a bizarre and ingenious attempt to cause forest fires by incendiary bombing from sub-borne aircraft, but realized only negligible results.

But then they tried Fu-Go...

A Sunday School group from the lumber mill town of Bly, Oregon, went for a picnic on nearby Gearhart Mountain on Saturday, May 5, 1945. Five children accompanied Rev. Archie Mitchell and his wife Elsy on the outing. While Archie was parking the car, Elsy and the children gathered around an odd object lying near the wooded picnic site. One of the boys was poking at the item with a stick. Archie, some 40 feet away, shouted a warning to leave it alone. As we will see, he had good reason to do so. The object exploded, killing Mrs. Mitchell and the children, laying them out like the petals on a flower.

They were the only US civilian casualties on the US mainland for the entire war (recall that Hawaii and Alaska were not States yet).

The Japanese wanted to strike at the US mainland the same way the Doolittle Raid did to Japan early in the war. They actually built an aircraft-carrying submarine, and used one of them to try to cause forest fires in the Pacific Northwest, in an attempt to "count coup" and tie up manpower fighting fires. They also used subs to attempt to bombard shore facilities. One of those was an ineffectual attack on a southern California oilfield (the [ineffective response to this attack](#) was the inspiration for part of the comedy movie, *1941*). Another was a mini-bombardment of Ft. Stevens in Oregon. No casualties and almost no damage resulted from these attacks.

More formidable was the Japanese Fu-Go balloon bomb program. The idea was to use large hydrogen balloons, a few made of scarce rubber, but most made of multi-laminated rice paper, to carry a rack of small incendiary bombs with one larger fragmentation bomb. The balloon carried a crude anemometer; when the balloon lost a little hydrogen and started descending, the barometer would trigger the explosion of a plug holding a bomb to the rack, lighting the

load and allowing the balloon to regain altitude. The rack also carried bags of sand ballast held on by explosive plugs. They would be the first to blow, dropping sand bags into the Pacific before the balloon had (hopefully) made it across. The larger bomb would be the last to go, and it was such a bomb that killed the Oregon picnickers.

The government knew of the balloon bombing program, but it strictly suppressed that knowledge so as not to panic coastal residents. However, enough (bits of) balloons had been found, and enough odd explosions in the woods had been heard, that balloon rumors were common. Rev. Mitchell had heard those rumors; that's why he shouted the too-late warning.

The loss of five children was news that could not be suppressed, but an explosion of unknown cause was given as the reason for their loss.

These were not tiny balloons, and the balloon program was a significant military effort, however desperate. *Hundreds* of balloons made landfall stateside. The Japanese were never sure how successful the program was, or wasn't. They had tried to place primitive telemetry on a few of the early balloons, but they used the "better quality" rubber balloons for those tests. It turns out that the rubber used was not very durable, and the expansion/contraction of the balloon as it changed altitude tended to pop the balloon before it made it across the ocean. The paper balloons did better.

The US military collected as much of the balloon bomb debris they could. They also recovered some of the ballast sand bags that had failed to drop. That sand had a distinctive mineralogy. We knew that the bombs were being launched somewhere in Japan, and we knew what the beaches were like from pre-War visits. Our guys were actually able to determine the launch site based on the analysis of the ballast sand alone! Had the War not ended so soon after that, we would have bombed the launch site.

NOTE: The paragraph above contains incorrect information. See the added material at the end of this Item.

Still, be careful in the northwest woods. A Fu-Go bomb, technically functional, [was found](#) in eastern British Columbia **in 2014!**

After the War, the Soviet Union developed the atom bomb, and the Cold War began. We were extremely interested to monitor Soviet military capabilities in all areas, but how could we perform reconnaissance? Conventional airplanes lacked the necessary ceiling and range to overfly areas of interest (a decade later, the US began using U-2 reconnaissance flights, until Francis Gary Powers was shot down on one in 1960). Space-based overflights were not possible until a few years after the launch of Sputnik. So what to do?

The lessons of the balloon bombs were not lost on our military planners. We had learned about the high-altitude current of air, now known as the "jet stream," when we tried to bomb Japan from B-29's flying at 30,000+ feet. The planes faced extremely-strong headwinds of varying intensity, making bombing accuracy impossible, even with the crudely-guided bombs of the day. Only when the B-29's came in a much lower altitude was bombing accuracy restored.

The planners first thought, “What if we put some good cameras on a high-altitude balloon, and launched it from a safe European location, upwind of the USSR. We could recover the balloon, its cameras, and its exposed film magazines when the jet stream had carried the balloon clear of the USSR. We wouldn’t be able to steer the balloon in real time, so we would have to accept any pictures we were lucky enough to get, but if we used a LOT of balloons...” They refined the idea to have the balloon carry microphones capable of hearing distant explosions (of atomic bombs), the basis of what would become [Project Mogul](#). Mogul microphones would detect atmospheric nuclear tests, without needing accurate position location of the balloon.

The potential utility of Project Mogul was eclipsed first by the U-2 and then by [Project Corona](#). Corona satellites would acquire images of Russian targets, and drop the film in re-entry capsules that would be captured by a hook-carrying plane as they parachuted down over the ocean (that way, if the plane missed, the cannister would be lost in deep ocean water). The system never went operational. But its legacy lives on today in another, odder, form.

One of the primary places we built and tested our reconnaissance balloons was Holloman AFB in New Mexico, located near the town of Alamogordo. The prevailing winds were from the southwest, blowing from Holloman toward the New Mexico town of (wait for it) Roswell. Occasionally a balloon would malfunction and come down after traveling only a few dozen miles. The balloons were difficult to track on radar, so the engineers testing them would build a flimsy wooden frame and line it with mylar (aluminized plastic sheeting, familiar now but new and unfamiliar in 1947), which dramatically increased the radar return.

I’m sure you can see where this is going. One of the balloons went down a few miles west of Roswell and was found by a local rancher. They reported it to the local military authorities, thinking it was a crashed aircraft. The authorities knew differently, of course, but they were frantic to keep any word of it under wraps. When the notion came up that the Roswell wreckage was a crashed spacecraft, the authorities had their cover story.

We even know which test launch was the culprit (Project Mogul #4). But no amount of logical reasoning will stand in the way of the story needed to maintain the majority of Roswell’s present income. After all, finding a downed test spy balloon downwind of the main US test site of spy balloons is MUCH less likely than the wreckage found near Roswell was a crashed space alien flying saucer! (Do I really need to add “/s”?)

There is a monument to Mrs. Mitchell and the children on Gearhart Mountain. The Mitchell Recreation Area in the Fremont-Winema National Forest is on the site of the disaster. It was burned over in the Bootleg Fire of 2021, but fire fighters were able to protect the memorial site with a fire line; see: https://en.wikipedia.org/wiki/Mitchell_Recreation_Area.

There is also one more twist to this story, a bad one.

Archie Mitchell was heartbroken by the loss of his wife, but in time he ended up marrying the older sister of two of the balloon victims. He continued his ministry and went to Viet Nam for two five-year missionary stints, attending to leprosy sufferers, starting in late 1947. On May 30,

1962, Mitchell and two others were captured by the Viet Cong and forced to provide medical care for their soldiers. They were never seen again.

UPDATE (March 24, 2024)

The paragraph flagged above had an error and needs an update. It said, “The US military collected as much of the balloon bomb debris they could. They also recovered some of the ballast sand bags that had failed to drop. That sand had a distinctive mineralogy. We knew that the bombs were being launched somewhere in Japan, and we knew what the beaches were like from pre-War visits. Our guys were actually able to determine the launch site based on the analysis of the ballast sand alone!”

First, the error. The “distinctive mineralogy” was not the clue to the beach where the balloon bombs were being prepared and launched, rather, it was the distinctive small seashells the sand contained.

Julia Gardner was an amazing scientist, one of the first women to be hired by the U.S. Geological Survey. She had attended Bryn Mawr College, earning a B.S. and M.S. in Geology in 1905. She then became the first woman admitted as a full-time graduate student at the Geology Department at Johns Hopkins University, earning a Ph.D. in 1911. Her academic specialty was sedimentology and the study of mollusks. Her first field area was studying Upper Cretaceous sedimentary rocks of Maryland.

Dr. Gardner began working as a contractor in the U.S. Geological Survey in 1915, but soon left to serve as a volunteer auxiliary nurse with the Red Cross in WWI. After the War, she returned to the U.S. and rejoined USGS in 1920.

She continued her sedimentological research, becoming intimately familiar with Tertiary-age layers and fossils along the Atlantic coast from Maryland to Mexico, which made her quite valuable to the inter-War petroleum industry, consulting often on their exploration efforts.

When WWII rolled around, she became the leader of a group within USGS informally known as “The Dungeon Gang.” It was Dr. Gardner’s expertise and familiarity with mollusks from around the world that helped her and the other Dungeon dwellers figure out exactly which beach in Japan (Ichinomiya) that was providing the sand used in the Fu-Go balloon bombs ballast system!

Dr. Gardner authored many scientific studies in the years after WWII. She even had a snail species named after her, *Ecphora garnerae*, which became the official state fossil of Maryland in 1994. She served as the President of the Paleontological Society, and Vice President of the Geological Society of America. She retired from the USGS in 1952, and was awarded USGS’ highest honor, the Distinguished Service Medal. She passed away in 1960; the memorial to her written by the GSA said in part, “She left no close relatives, but she did leave a host of friends, none of whom will ever forget her.”

For more from the USGS, see: <https://www.usgs.gov/news/featured-story/julia-gardner-5-things-know-about-a-pioneering-woman-usgs>.

REFERENCES

Everything you might want to know about the Fu-Go balloon bomb program: Smithsonian Annals of Flight, number 9, "Japan's World War II Balloon Bomb Attacks on North America," by Robert Mikesh: https://repository.si.edu/bitstream/handle/10088/18679/SAoF-0009-Lo_res.pdf?sequence=3&isAllowed=y.

For even more on the Balloon Bombs: Webber, Bert, 1992, *Silent Siege III: Japanese Attacks on North America in World War II*, Webb Research Group, ISBN 0-936738-73-1

There was a display of Fu-Go related objects in NASM's Udvar-Hazy Center as of August, 2018, however, there is no mention of it on the NASM website using any reasonable search parameters. The display is/was located on the east wall of the southern part of the UHC, near the display of balloon-related china, furniture, and other balloon artifacts. DOCENTS?

Smithsonian Magazine article on the Fu-Go balloon bomb program:

<https://www.smithsonianmag.com/history/1945-japanese-balloon-bomb-killed-six-americansfive-them-children-oregon-180972259/>

More: <https://www.atomicheritage.org/history/japanese-balloon-bombs-fu-go>

Archie E. Mitchell: https://en.wikipedia.org/wiki/Archie_E._Mitchell

Mitchell Capture: <http://www.cmalliance.org/alife/missionaries-kidnapped-how-it-happened/>

The Mitchell bombing site is now the Mitchell Memorial Forest; their website doesn't mention what the MMF is memorializing: <https://www.greatparks.org/parks/mitchell-memorial-forest>

Memorial on Gearhart Mountain: Fortunately, Wikipedia is more thorough than the MMF: https://en.wikipedia.org/wiki/Mitchell_Recreation_Area

History.com 70th anniversary of Mitchell death: <https://www.history.com/news/attack-of-japans-killer-wwii-balloons-70-years-ago>.

Japanese submarine bombardment of Ellwood oil fields, Goleta, CA: <https://goletahistory.com/attack-on-ellwood/>

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https://www.eugeneleeslover.com/Japanese_bomb_Oregon.html

https://en.wikipedia.org/wiki/Bombardment_of_Fort_Stevens

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https://www.eugeneleeslover.com/Japanese_bomb_Oregon.html

Smithsonian Magazine article on the Roswell "UFO":

<https://www.smithsonianmag.com/smithsonian-institution/in-1947-high-altitude-balloon-crash-landed-roswell-aliens-never-left-180963917/>

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