



ACTIVITY: Swimming

CASE: GSAF 1994.03.23.b

DATE: Wednesday March 23, 1994

LOCATION: The incident took place in the Pacific Ocean 300 miles east of Easter Island and 30 nautical miles from Sala-y-Gómez Island. Sala-y-Gómez, a small uninhabited island, is the easternmost point in Polynesia. The tiny island belongs to Chile and is part of its Easter Island Province. It lies 3,220 km west of the Chilean mainland.



The 303-ft NOAA research vessel *Discoverer*

NAME: Heather Marie Boswell

DESCRIPTION: The swimmer was a 19-year-old Caucasian female, 5'3", and weighed 130 lbs. She was clad in a black bathing suit top and navy blue shorts. She wore a gold ring on the ring finger of her right hand. She was not menstruating and had no injuries before the incident. Boswell had signed on for a six-month term working in the galley of the ship.

SHIP: The US National Oceanic and Atmospheric Administration's 303-foot white-hulled NOAA research ship *Discoverer*.

BACKGROUND

WEATHER: The sky was cloudless and the air temperature was between 85°F and 90°F.

MOON PHASE: First Quarter, March 20, 1994

SEA CONDITIONS: The water was warm, about 80°F. The sea was vivid blue and clear, underwater visibility was 300 feet, and there was a gentle swell.

ENVIRONMENT: There were nine other swimmers in the water. One of the women had her menstrual period and several people were using floatation devices.

DISTANCE FROM BOAT: 10 feet

DEPTH OF WATER AT INCIDENT SITE: Unknown

TIME: 11h58

NARRATIVE: Nine of the crew were taking a break from their shipboard duties on that hot

day, an open ocean swim in a balmy sea. Most had been in the water for 90 minutes, but Heather had been in the water only 45 minutes when the shark approached the swimmers.

The first strike was directed at Phil Buffington. He was in the water next to his girlfriend who was menstruating. The shark bit Buffington's thigh but released him when he struck its head. (Buffington's wound required 50 stitches to repair.)

Next, the shark turned its attention on Boswell who was about 25 feet away and slightly isolated from the group. The shark came from behind and made two strikes. On the first strike, the shark grasped her right ankle and leg, pulling her beneath the water and shaking her violently before releasing her.

As Boswell's shipmates approached her in a skiff, the shark made a second strike, grabbing her left leg. One of the shipmates tried to drive away the shark by beating it with a stick while two shipmates grabbed her arms. Boswell felt her left leg pop. "I thought it was my hip dislocating," she said. Only when she was pulled into the skiff did she realize that her leg had been severed by the shark.

Then the shark headed for another person dangling in the water from a ladder, but disappeared after shots were fired at it by crew onboard the research ship.

INJURY: Buffington sustained numerous puncture wounds to his lower extremities. Boswell sustained a traumatic amputation of the left leg at the level of the proximal thigh..

FIRST AID: As soon as Boswell was taken from the water, a tourniquet was placed on her leg. On board the ship, nurse Judy Layne administered IV fluid replacement and a CNS depressant (morphine) to relieve pain. "The pain started about 20 minutes after the attack, except when they pulled the boat from the water and hit the ship with it – that was probably about two minutes after the attack - but other than that jolt, no pain for a while," said Boswell.

Twenty hours later ship reached Easter Island where Major La Fon, Flight Surgeon with the 24th Medical Squadron of the US Air Force base took an x-ray and she was airlifted to Panama (Howard Air Force Base) where the 24th Medical Squadron is based. There, Boswell's wound was debrided and her condition was stabilized. Two days later she was airlifted to Harborview Medical Center in Seattle, Washington.

TREATMENT: Surgeon Douglas Smith, M.D. continued Boswell's treatment at Harborview Medical Center.

SPECIES INVOLVED: The incident involved a white shark, *Carcharodon carcharias*, about 15 feet [3.6 metres] total length. Boswell describes the shark's demeanor as "very calm and deliberate".

CASE INVESTIGATORS: Marie Levine and Dr. Erich Ritter, Global Shark Accident File.

NOTE: Eight years after the incident, Boswell appeared in a film produced by Discovery Channel: *Anatomy of a Shark Bite*. Afterwards, The Shark Trust contacted Boswell to learn her thoughts on sharks, and posted her response on the internet:

"First off, I probably should let you know my feelings about sharks. I think they are

fascinating, beautiful, mystifying creatures. I wish no harm to them. I feel badly for sharks kept in aquariums - and on that note I feel bad for any animal in a zoo. No creature should be kept in containment simply for our amusement. I would like more to be known about sharks.

"My main reason for doing this show [Anatomy of a Shark Bite] was that it was something different. No one had done such a thing. My thought on shows about sharks is this: as long as they aren't advertising them as "man eaters" (if that were the case, I never would have been bitten — ha ha?) then the more people feel they know and the more comfortable people become with the idea of sharks.

"Once the shark becomes as common, as say rattlesnakes, they won't seek them out to slaughter them. Yes, people will know sharks can be dangerous - that is a fact - but they aren't coming out of the water and on to land to eat us and we shouldn't be going into their water to catch and eat them. Or hunt them simply for sport, or on the false pretense that we are making waters safer. When in reality if we were to exterminate sharks from our oceans, it would cause an ecological backlash no one would like to think about. Besides, what would be next? Barracudas, Orcas, Eels, Jellyfish...okay, I'm getting off point.

"I agree with you about the sensationalist aspect of the show "Anatomy of a Shark Bite." It's unfortunate that television has to put that kind of a slant on everything, but to be honest, not much of the world would watch programming if there wasn't some hype to it. We'd all be reading books. What a concept, huh.

"As far as this particular episode, I found it very unique. True, it wasn't as scientific as it could have been, but it was interesting and fun. I found nothing traumatic about the re-enactment. The worst part of shooting was the smell of the meat (I'm a vegetarian and found that part disgusting.)

"The man who starred in the show, Dr. Erich Ritter, was honestly trying to make a quality program, butting heads with the director often. I think that in order for Dr. Ritter to get his message out there, he had to concede quite a few times to some less than ideal shoots.

"All of this is just from my own perspective as a member of the general population, not from a scientist, producer, trustee, shark hater, or conservationist. So, of course everyone will view this and all programs about sharks in a different light.

"I do appreciate your efforts in preserving, studying and protecting sharks of all kinds. It is a much needed endeavor and I wish you all the best." ... Heather Boswell



This attack was captured on tape posted on YouTube.com. The frame from the video shows the moment the shark bit Heather's leg. The shark's fin is at the top left of the frame.

Medical care onboard consisted of the standard trauma life-support procedures. Hemorrhage was controlled with a tourniquet. Intravenous fluid resuscitation was initiated via two 18-gauge intravenous catheters; the patient received supplemental oxygen; and her cardiac activity was monitored. Attempts at bladder catheterization to monitor urine output and tissue perfusion were unsuccessful. During the entire time the patient was alert and cooperative. The patient demonstrated clinical signs of hemorrhagic shock, and her initial vital signs revealed hypotension and tachycardia. After fluid replacement, the vital signs stabilized. Additionally, the patient received Morphine for pain, antibiotics, and was given Compazine for nausea.

The second patient [PB] received routine wound care and had his lacerations sutured after the more critical patient was stabilized. He remained stable throughout the entire transit time.

During the 20 hours it took to rendezvous with the medevac team HB received continuous care and monitoring. Her status remained critical and marginally stable throughout the entire transit. Blood pressure and mental status were used to gauge the effectiveness of fluid resuscitation, as urine output could not be monitored. MAS remained in regular contact and provided consultation to the ship's nurse.

After arrival at Easter Island, the patient experienced a brief period of unresponsiveness and hypotension after being repositioned. She responded to noxious stimulation and a fluid challenge. A Chilean medical team boarded the vessel and offered to take [the patient] to a local medical facility for care. In consultation with his medical team, the Captain declined. The Chileans insisted that the Captain sign a written statement attesting to his decision.

The U.S. Air Force transport team arrived at daybreak. The team consisted of a Flight Surgeon and several flight nurses and flight medics. Multiple attempts to place a central venous line were unsuccessful. After 4 hours of additional attempts at starting intravenous lines, the patient was transported *off DISCOVERER* in the RHIB. The team stopped at a local Chilean medical facility to perform chest radiographs in order to exclude the possibility of a pneumothorax induced by the attempts at a central line. After this, the patient was transferred to the aircraft and transported to Panama.

En route to Panama, the patient experienced a period of desaturation as detected by pulse oximetry. Altitude reduction, application of supplemental oxygen, and additional pressurization of the aircraft cabin were performed and the patient's oxygen saturation returned to normal.

At Gorgas Army Hospital, surgical hemostasis was accomplished, blood replacement performed, and surgical debridement done. After these procedures, the patient was transported via commercial fixed-wing medevac to Seattle, where PMC had made arrangements for further surgical evaluation and rehabilitation.

DISCOVERER crew members received critical incident stress (CIS) debriefings from a U.S. Navy Special Psychiatric Intervention Team (SPRINT), a unit of mental health professionals who have expertise in CIS. This team flew to Easter Island via commercial aircraft on March 28. It is of note that a large portion of the scientific party on board during the attack left the ship prior to debriefing.

...From the official NOAA Report

IN THE WATER

Just prior to the attack BGL [Boatswain Group Leader] relieved SS [Seaman Surveyor] as coxswain of the RHIB. BGL repositioned the RHIB about 30 yards off the ship's Hero platform and began checking the area to locate all the swimmers. It was about this time that BGL heard one of the swimmers shout, "I'm not kidding there's a shark." Looking over the side of the RHIB, BGL saw a very large shark heading for the swimmers. On approaching the shark, BGL saw the animal submerge and then resurface and begin bumping or pulling H.B. away from the other swimmers. BGL then put her close on the RHIB's starboard bow; the rest of the swimmers were now on the port side of the boat swimming towards the ship's Jacob's and net ladders. With the assistance of ET [Electronics Technician] and OS [Ordinary Seaman], BGL Ofsthus grasped H.B. and attempted to pull her from the water. However, the shark had her legs in its jaws and pulled her under the water; at this time the shark bit off H.B.'s left leg, which released her from its mouth. She came back up to the surface and without delay BGL and OS lifted her over the side of the RHIB. Seeing her missing leg, BGL immediately clamped his hands around her upper thigh, applying direct pressure to the femoral artery to reduce her loss of blood. Other personnel who had been in the water were being assisted into the RHIB and helped to climb up the ladders as H.B. was being brought to the rescue boat. The RHIB with OS at the helm, turned and made for the starboard side of the *DISCOVERER*, midships, to commence recovery.

During the time of the attack, EU [Engine Utilityman] was in the process of cleaning the handgun he had earlier checked out for the afternoon target shoot. Hearing the PA system announcement of a shark attack, he loaded his weapon and proceeded to the starboard side of E-deck near the Hero platform to render assistance. EU saw the RHIB recover two of the swimmers, but saw that at least one person was in reach of the shark. With the RHIB and other personnel well clear he commenced firing at the shark, apparently driving it away from the swimmer. The shark swam around *DISCOVERER*'s stern to the port side of the ship with EU in pursuit. By this time EU had fired four rounds at the shark, hitting it once. The shark then started back around the stern to the ship's starboard side. Not knowing if all personnel had been brought safely aboard, EU fired two more rounds into the shark at close range. Upon being hit in the head by the last round, the shark rolled hard over on its side, shook for a few seconds, then sank with no apparent motion.

RHIB RECOVERY: OS brought the RHIB and its passengers alongside *DISCOVERER*. The RHIB was raised with all aboard to F-deck where officers and crew applied a crude (leather belt) tourniquet to H.B.'s upper thigh, placed her on a stretcher, and transferred her to sickbay. P.B. who was bitten deeply on both legs when the shark first appeared among the swimmers, was escorted below decks by a crewmember and received medical attention in the Technician's Mess. The *DISCOVERER*'s Medical Officer, then, efficiently and effectively directed her medical team and other members of the crew and scientific party to provide for H.B. and P.B.

COMMUNICATIONS: Seeing the initial attack, LET [Lead Electronics Technician] knew that serious injuries had been suffered by a crew member. He immediately proceeded to the Radio Room and contacted personnel with MAS, to begin procedures for receiving emergency medical assistance and advice. He outlined the situation to MAS and began passing information concerning H.B. (age, sex, vitals, etc) and the ship's position. LET assisted the Executive Officer and Lieutenant as they provided updated medical reports to MAS on the progress of H.B. and P.H. This information was obtained from a Lieutenant Commander as she attended both patients. LET and ET remained in the Radio Room throughout the rest of the day and into the early hours of the next day to manage message traffic. Messages were also passed to the ship's agent at Easter Island, who contacted the Chilean authorities and arranged for the ship to be met immediately upon arrival (scheduled at approximately 04h00L 24 March 1994).

MEDICAL TREATMENT: When brought aboard *DISCOVERER*, H.B. had suffered traumatic

amputation of her left leg at mid-thigh. She had lost an unknown quantity of blood, and been tourniqueted, and was in acute shock. She was transported rapidly by stretcher from F-deck shelter area to Sickbay on E-deck, where she was transferred to the examination bed. At this time H.B. had no measurable blood pressure, her pulse was thready and weak. She was unresponsive and was hemorrhaging from vessels other than the femoral artery, which had been effectively shut off. The leather belt tourniquet was tightened until all bleeding was significantly slowed. Two intravenous (IV) fluid lines were inserted in her left arm, with Ringer's Lactate (wide open). She was installed on a cardiac monitor and pure oxygen was administered via facemask at 10 liters/minute. She was placed in a Trendelenburg position with her lower trunk elevated. At this point her condition was extremely critical; her body temperature was 93 degrees Fahrenheit. Her wet clothing was removed and she was covered with blankets. With the fluids replacing her lost blood, she stabilized in approximately 30 minutes (having received about two liters of R/L) and a blood pressure of 60/p was obtained, with a pulse of 120/thready and weak. At this time medical attention was given to H.B.'s right leg, which had been badly mauled by the shark. None of the deep puncture wounds or gashes were hemorrhaging, and although there was no palpable pulse in the leg, neither was there cyanosis. Her right leg was covered with towels until time could be spared to attend to it.

For the next 2-3 hours, Lieutenant Commander continued to push fluids into H.B. intravenously, so that the patient had taken six liters in that 2-3 hour period. H.B.'s blood pressure at this point was systolic 106-112, diastolic in the high 60's. The patient was now alert, complaining of pain, and nauseous. A Compazine suppository was administered for her nausea and 4 mg Morphine Sulfate IVP for pain. The patient was taken out of the Trendelenburg position and was laid flat with the left stump elevated so that further medical attention could be given to the right leg. When hemorrhaging of the stump had been stopped, the left leg was packed in saline-soaked gauze and wrapped in a saline bandage.

Lieutenant Commander left H.B. under watch by M, a member of the scientific party who had training as a nurse, and attended to P.B.'s injuries. He sustained a series of deep puncture wounds on his right knee and lower thigh and several gashes on this left thigh, requiring approximately 50 stitches to close the cuts. Antibiotics were administered to prevent infection in accordance with instructions from MAS, and the patient was made as comfortable as possible.

For the next two to three hour period, H.B. was closely watched with the emphasis being on maintaining stable vital signs through fluid balance, pain control, and moral support. By approximately 1800L on March 23, the patient was stable enough that visitors were permitted to talk with her and hold her hand to provide emotional support. No attempt was made at suturing her injuries because Lieutenant Commander knew that H.B. would require major surgery as soon as she could be transported to a hospital, and did not want to add to the trauma of unnecessary treatment to that which the patient had already suffered. Insertion of a Foley catheter was unsuccessfully attempted four times during the night; the urethra could not be located. The patient was maintained on pain medication (2-4 mg Morphine as required) and IV fluids were decreased to 150 cc/hour. She was taken off the mask and a nasal cannula was inserted to provide oxygen at a flow rate of 4-6 liter /minute. The patient remained awake and alert throughout the night, occasionally taking 10-15 minute naps. Her vital signs stabilized at : BP—120/60; PR—68 and regular; respiratory rate—16 and regular. A physical assessment at this time (approximately 2100L) showed that she had strong pulses throughout her right leg and other extremities. Oozing from the stump was minimal; there was some pink sera sanguineous. The saline dressing was reinforced. The patient maintained well throughout the remainder of the night with good blood pressure. Her bladder was beginning to distend by morning due to fluid intake and inability to catheterize. When asked if she could void, she replied, "No", so catheterization was again attempted with negative results. Pain medication, Compazine, oxygen and fluid maintenance were continued throughout the night. H.B. received two doses of antibiotics in accordance with instructions from MAS. Altogether she received 20 mg of Morphine Sulfate, 10

liters of fluids, and oxygen sufficient to maintain her blood at 100% O₂ saturation level. At approximately 0720L on 24 March the patient was turned on her right side to remove wet dressings and blankets and to apply dry ones preparatory to transporting her to the Rescue 40 MEDEVAC flight. Her condition was so fragile that she rapidly became hypotensive, losing all measurable blood pressure and dropping to a respiratory rate of 4/minute. She was returned to the Trendelenberg position, her IV's were opened full, the flow of oxygen increased, a sternal rub was initiated, and preparations were made to administer cardiopulmonary resuscitation. CPR was not necessary, and the patient gradually restabilized. At 0807L, Major __, the U.S. Air Force flight surgeon and medical team leader from the Rescue 40 MEDEVAC flight, was transported aboard *DISCOVERER* and reported directly to Sickbay. The MEDEVAC team under Dr. __ took over responsibility for H.B.'s care and treatment, prepared her for transport off the ship, and removed her to Easter Island's Hanga Roa Hospital at 1142L on 24 March.

MEDEVAC LOGISTICS: The medical evacuation flight, given the mission designation "Rescue 40", was arranged by personnel from MAS and the PMC Operations Department working through the U.S. Air Force Joint Rescue Command Center in Honolulu, Hawaii. The flight originated out of Howard (U.S.) Air Force base in Panama. During the late afternoon and evening of 23 March, while logistics for the flight were still being arranged, *DISCOVERER*'s Commanding Officer was in contact with Dr. __ the U.S. Air Force flight surgeon who had been designated as Rescue 40's medical leader. Dr. __ was very specific in requesting that the patient not be moved from *DISCOVERER* until the medical team had arrived aboard and could evaluate her condition. Discussions between CO, *DISCOVERER*, Rear Admiral __, NOAA, Director, OMC, and Lieutenant Commander, USPHS, PMC Medical Officer, reinforced this suggestion — with the understanding that H.B.'s condition would be the ultimate determinant.

The Rescue 40 KC-135 aircraft touched down at Hanga Roa's Mataverí airport at 0727L 24 March. Arrangements had been made with the ships A. J. Broom agent in Easter Island to transport the medical team and their equipment from the airport to the harbor and then by small boat out to the *DISCOVERER*. Chilean customs officials were aboard the ship to handle passport and visa authentication for the medical team and patients. The MEDEVAC team reached the ship in two groups between 0807L and 0823L. Dr. __ immediately assumed charge of H.B.'s treatment and preparation for evacuation. Several unsuccessful attempts were made to increase the volume of IV fluids being given to the patient, and it was decided to transport her to Hanga Roa's hospital to take X-rays. The Commanding Officer refused the Hanga Roa Port Captain's offer of transport via Chilean Naval launch, determining to use the *DISCOVERER*'s RHIB because of that vessel's better stability and because H.B. could be placed directly in the boat before it was lowered. The MEDEVAC team and both injured NOAA personnel departed from the ship by RHIB at 1124L 24 March.

CHILEAN RELATIONS: Shortly after *DISCOVERER*'s arrival in Hanga Roa Harbor at 0355L 24 March, the ship was met by a Chilean naval motor launch carrying the Hanga Roa Port Captain and the Director of the Hanga Roa Hospital who examined H.B. briefly and offered the services of his hospital and medical staff; he recommended immediate transport ashore to the hospital. As H.B. was at that time resting and stable, the Commanding Officer determined to follow the recommendation of Flight Surgeon and Dr. __ and keep her aboard until the arrival of Rescue 40. The Chilean officials protested, indicating that they were both ready and properly equipped to assist, and in fact that because the attack had occurred in Chilean waters, they were obliged to provide whatever help they could. About an hour of negotiations followed, with the interpretive assistance of Mr. __, a member of the WOCE scientific party from the University of Miami. Eventually the Commanding Officer was asked to sign a statement acknowledging the Chilean government's offer of medical assistance and formally accepting full responsibility for her care until the arrival of the MEDEVAC flight. A statement had been prepared in anticipation of this request (Attachment 4), and a second statement approved and signed (Attachment 5). The Port Captain and hospital director departed at 0617L.

Following *DISCOVERER*'s return to Hanga Roa Harbor after fueling, on 25 March the Commanding Officer paid a courtesy call on Capitan___, Commandant of the Chilean Naval Station at Hanga Roa. By this time H.B. and P.B. had safely arrived in Panama and initial post – operation reports were optimistic. This information was passed on to Captian___ and a comfortable discussion followed, soothing any remaining ill feelings over *DISCOVERER*'s refusal to send the patients ashore by Chilean naval launch to Hanga Roa Hospital. Capitan___ asked that Captain ___ make a “voluntary” statement of the incident to the Chilean judicial representative (equivalent to a U.S. District Court judge). This was done as requested; a copy of the Spanish record of this statement is provided as Attachment 6.

SUMMARY: The extraordinary emergency medical knowledge, skill and professionalism displayed by BGL, Lieutenant Commander ...*DISCOVERER*'s emergency medical team, and by the Rescue 40 MEDVAC personnel were instrumental in preserving H.B.'s life until she could be properly cared for at Gorgas (U.S.) Army Hospital, Panama. The courage shown by H.B. herself in holding on and refusing to let go of life was inspirational to everyone who came in contact with her.