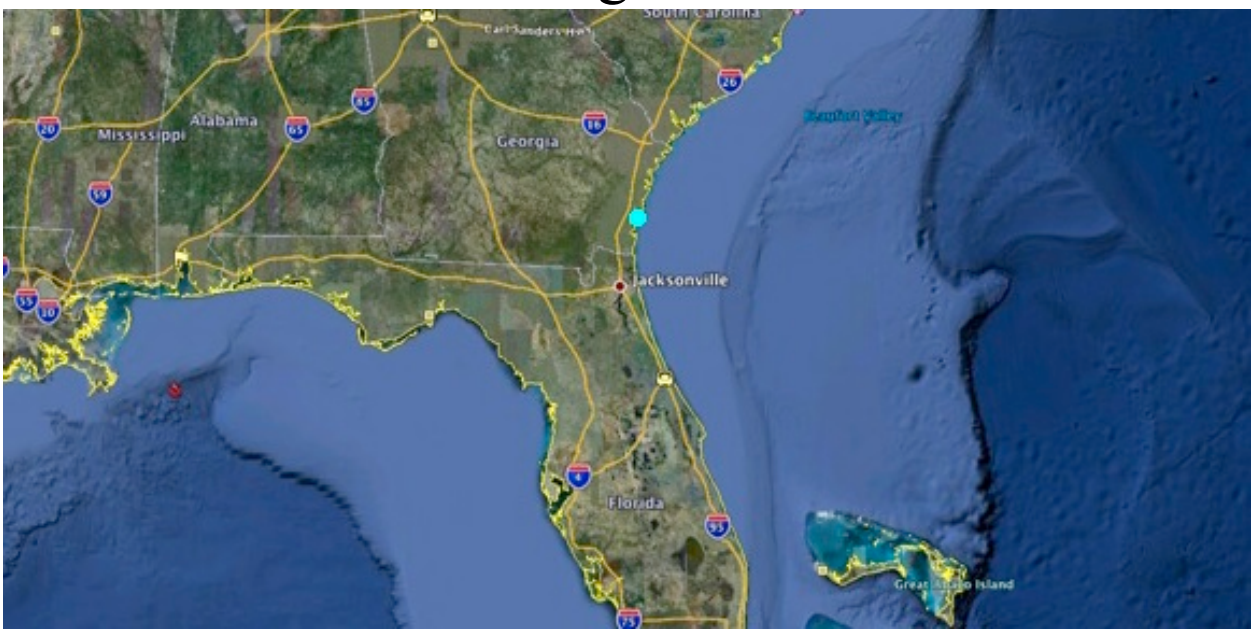
St. Simons Island GA USA Blue Lights - Frank Dodd (Tony) Smith, Jr. - 2010

USA (east)

Georgia (south)



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St. Simons Island

Around 1 AM EDT (Friday night - Saturday morning 30-31 July 2010) near high tide on on the West side of a Tide Pool on East Beach near Sixth Street on St. Simons Island, GA, which is a very dark beach with no artificial light exposure, with clouds mostly obscuring the moon,

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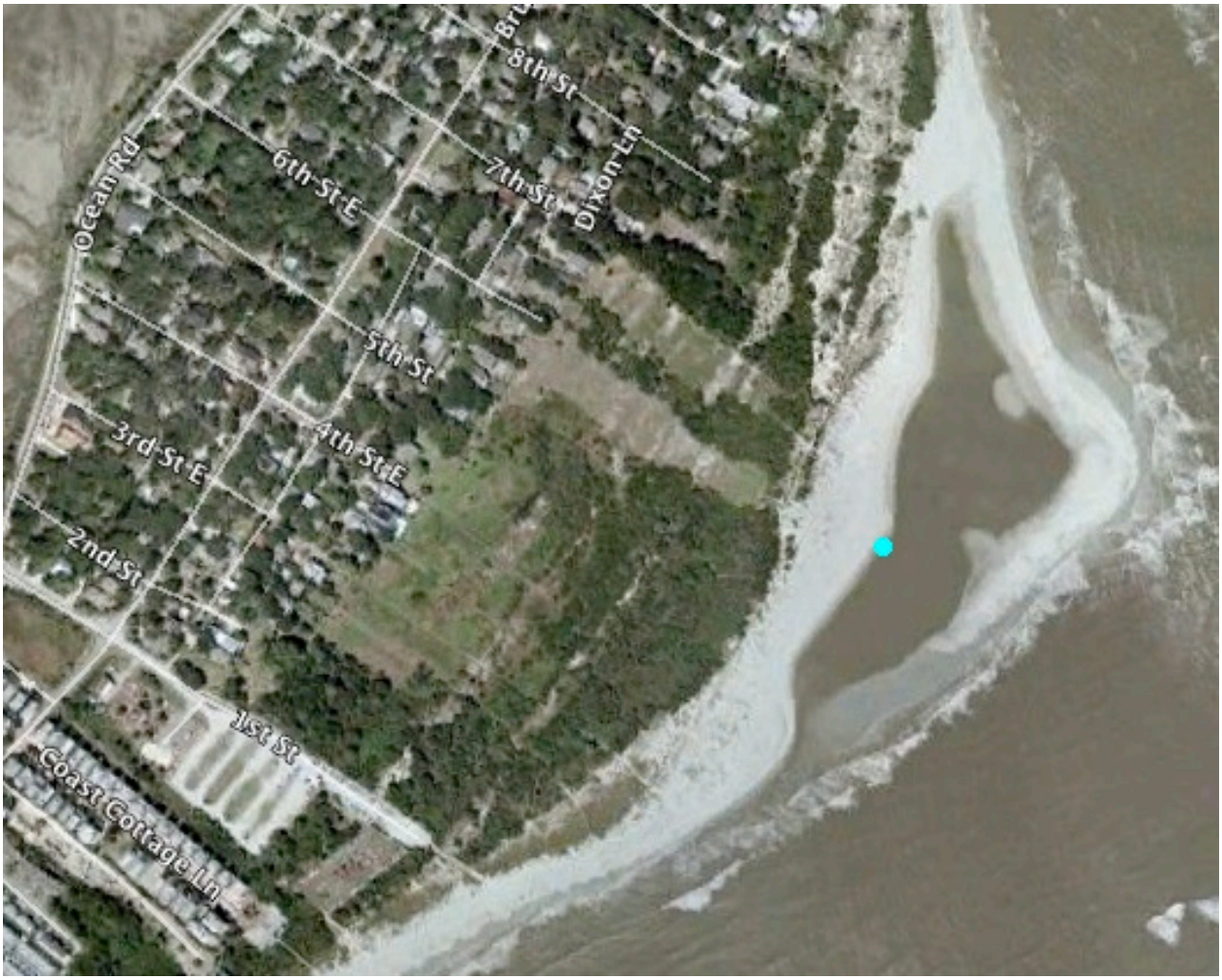
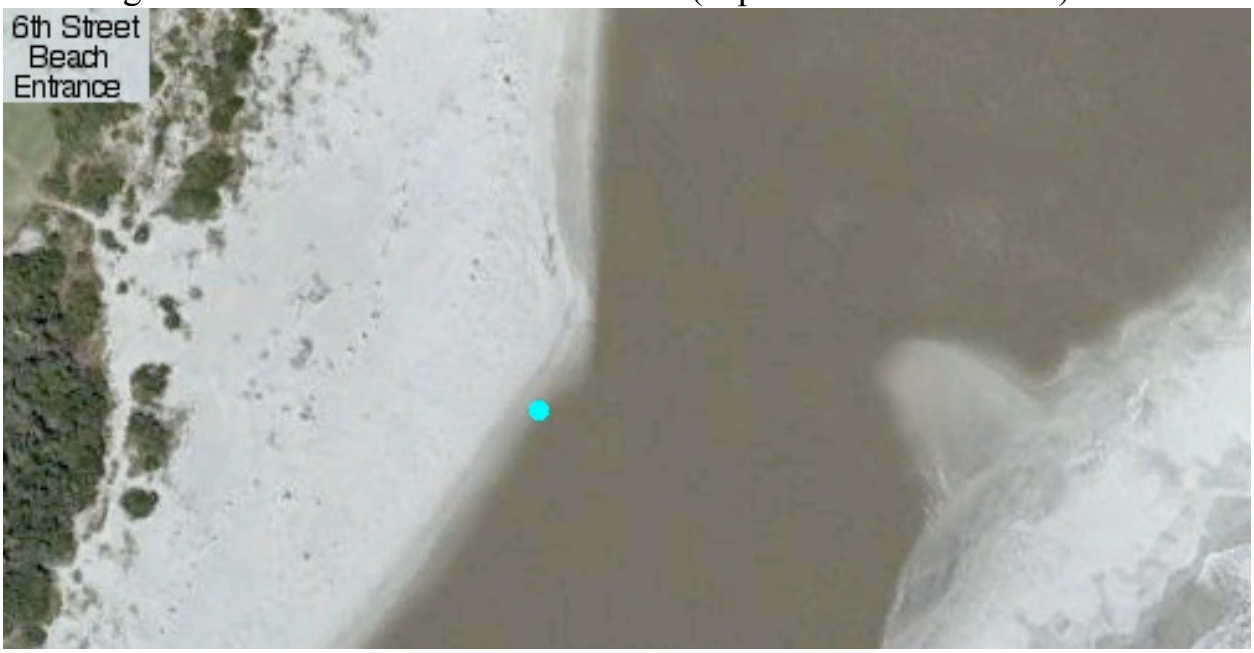


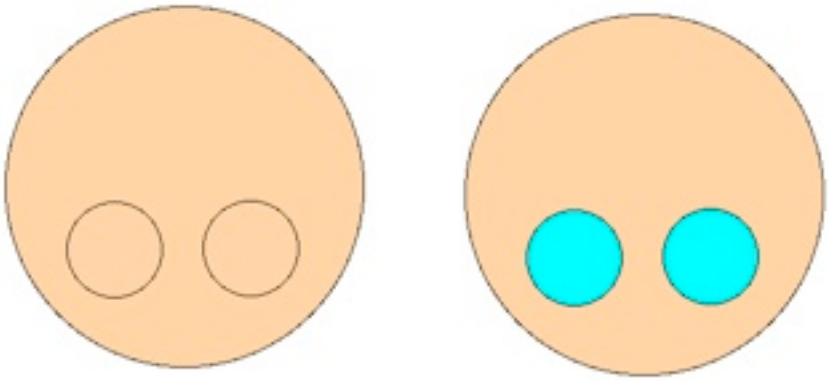
I was alone on the beach watching the Tide Pool fill up with the high tide water.

As I was shining a flashlight beam on the edge of the water,

a blue light shined back from under the water (depth a few centimeters).



Close observation showed that the source of the blue light was a circular creature lying flat on the sea floor, diameter maybe about 4 cm or so, that was sort of the color of the sea floor (and maybe to some degree translucent/transparent) with two circular regions that could turn bright blue (or cyan)



When I would shine the flashlight beam on it, it would respond by turning on one or both of its blue light regions, and sometimes a neighboring organism would also turn on its blue light regions. Further, it would respond to the flashlight beam by rising up from the sea floor (maybe a centimeter or so), sort of hovering/ undulating, and then would settle back down onto nearly the same spot on the sea floor and move its disk edges to throw a small amount of sand on top of itself, making it very much disguised as long as its blue lights were turned off.

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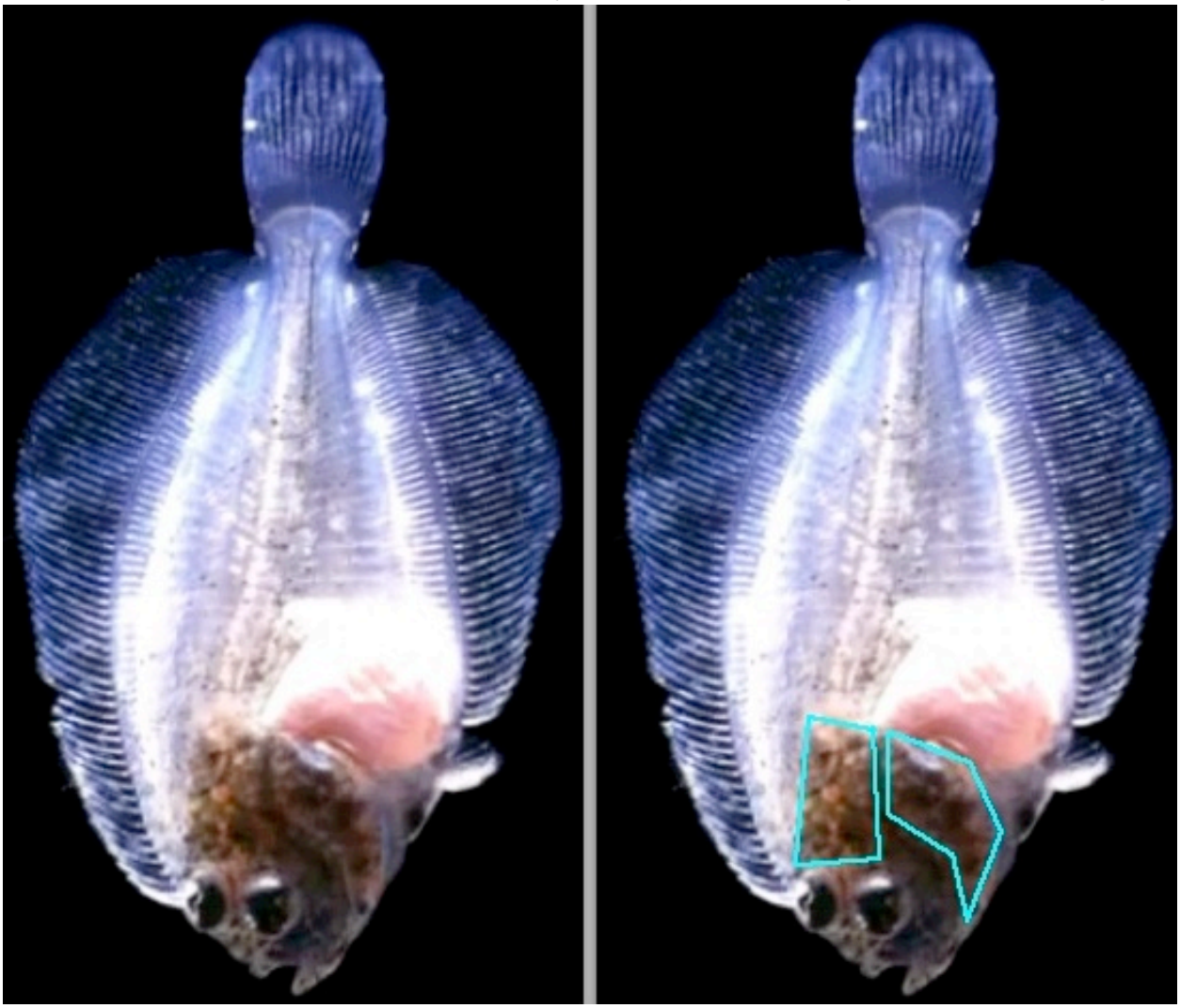
Steve Haddock of the Bioluminescence Web Page (lifesci.ucsb.edu) and Monterey Bay Aquarium Research Institute said, in response to my inquiry:
"... This is a curious observation. Did you ever see the blue light from the organism when you didn't have your own flashlight on? It sounds just like a little flatfish, and I'm wondering if the blue light could have been a reflection ... eyeshine ...off the eyes...? ... The sand "fluffing" behavior is very indicative of a flatfish ...",
so on the web at YouTube I found a video posted by Jobediah that showed flatfish development through the age at which both eyes had migrated to one side,
and it does indeed look very much like what I saw if the two blue light sources were the areas of two bones outlined (cyan lines) in the image below on the right:



The two eyes are too small to have been the blue light sources that I saw,
but since I cannot clearly recall seeing the blue light with my flashlight turned off it is possible that reflected light from the two bone areas could be the source of the blue (or cyan) light sources that I saw.

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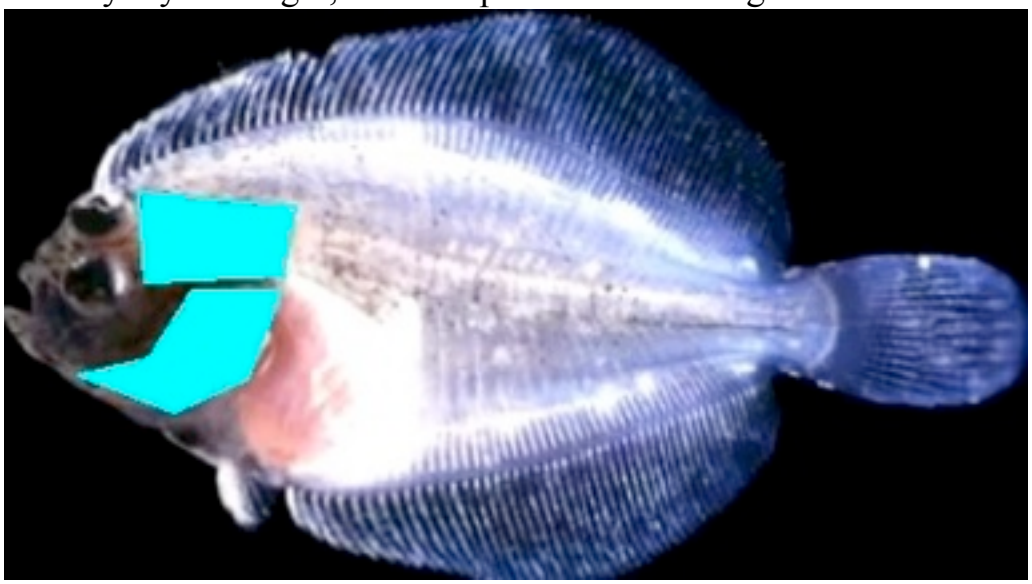
Nina Mukherjee, in a 25 April 2009 Associated Content web article, said: "... Flat fish, like the sole and halibut, live on the bottom of the sea ... They change color to match the mud, sand or gravel bed. They are colored only on one side, and can change color faster than a chameleon. Sole fish can turn more than one color at a time: brown, blue, green, yellow and even pink. ...".

Thomas M. Niesen, in "The Marine Biology Coloring Book" (Collins Reference 2000), said: "... Fishes ...[have] two types of pigment cells. ...
the iridocyte ... contains guanin ... that reflects light and color from ... outside ... iridocytes give rise to ... pearly white ... and ... iridescent blues and greens ...
The chromatophore ... contains its own pigment particles of red, orange, yellow, and black ... Green, for example, can be obtained by combining black and yellow ... The cell body itself is highly branched ... When the pigment is concentrated in the center of the cell, very little color shows ... for color to be seen, pigment granules ...[are]... dispersed throughout the branches. ...".

Derek Burton in "Flatfish ... chromatic biology", Rev. Fish Biol. Fisheries (2010) 20:31-46 said: "... primary .. colour ... responses to illumination ... are recognised ... during embryonic and early larval or later stages ...
primary responses ...[may]... be due to direct stimulation of chromatophores by light ...[and]... also have been considered to result from photic stimulation of the pineal and photoreceptors in tissue of the brain ...".

If the flatfish skin in the two bone areas contained iridocytes or chromatophores of blue/cyan color, and if display of that color were a reflection of or response to illumination by my flashlight, it would produce something much like what I saw:



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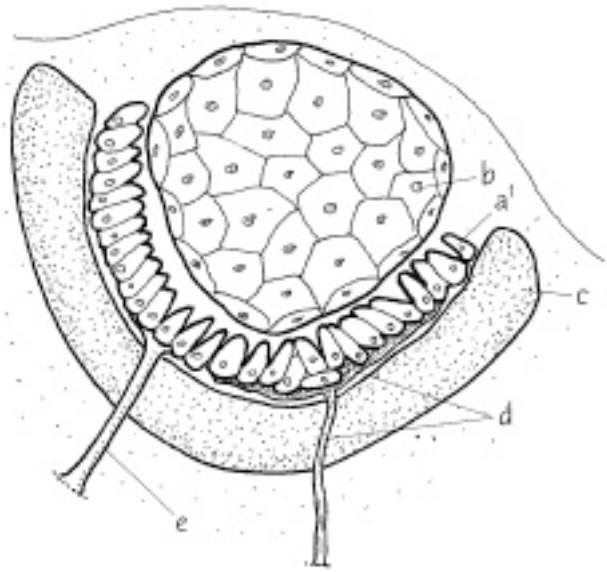
If it were to turn out that the blue light sources remained bright with my flashlight turned off, then their explanation might be bioluminescence from the each of the two bone areas.

Thomas M. Niesen, in "The Marine Biology Coloring Book" (Collins Reference 2000), said: "... many fishes produce their own light with ... photophores ...



[where a1 = photocyte, b = lens cell, c = reflector, d = nerve, e = blood vessel] ... Photophores are usually cup-shaped and may have elaborate focusing lenses and reflectors to concentrate and direct the light produced by the photocytes.
...
The small (7-8 cm, 3 in.), shallow water, flashlight fish of the Red Sea bears photophores that are among the brightest and largest found in any bioluminescent organism. However, the blue-green light emitted from these photophores is not produced by the fish themselves, but rather by billions of luminescent bacteria harbored within the photophore ... The fish possesses a fold of skin ... to cover the photophore and essentially "turn off" the light. Flashlight fish remain hidden in the coral reef by day and on moonlit nights. On dark nights, groups from a few to 60 fish congregate near the surface. The combined glow of their bacterial photophores attracts their small zooplanktonic prey. If a larger predator is attracted to the light, the flashlight fish ... blink and run ... up to 75 times a minute ...".

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A SeaPics.com image shows that the flashlight fish photophore is located near the eye, very similar to the anatomical location of the flatfish bone areas where I saw blue lights:

Catherine H. O'Brien and Ronald K. Sizemore, in Applied and Environmental MIcrobiology, Nov. 1979, p. 928-933, said: "... Bioluminescent bacteria were found in the water column, sediment, ... and gastrointestinal tract of marine fishes from the semitropical estuarine environment of the East Lagoon, Galveston Island, Tex. Populations in the water column decreased during cold weather while sedimentary populations persisted. The highest percentages of luminous organisms were isolated from the gastrointestinal tract of marine fishes, where they persisted during 5 days of starvation. The presence of chitin temporarily increased intestinal populations. ...".

Could flatfish bone areas, like chitin, foster colonies of bioluminescent bacteria that could form a pair of photophores like those of the flashlight fish ?