

RESEARCH  
ARTICLE

# Empirical Analysis of the Hugh Gray 'Nessie' Photograph

Roland Watson

shimei123@yahoo.co.uk

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## HIGHLIGHTS

Detailed inspection of the best-quality version of an early photograph of the 'Loch Ness Monster' does not verify the presence of a swimming dog or other familiar object. This picture thus remains an intriguing piece of evidence that seemingly supports a biological mystery at this famed location in Scotland.

## ABSTRACT

The vintage Hugh Gray photograph is the first ever to presumably show a 'Loch Ness Monster.' Many monster believers have regarded it as genuine proof, whereas others have insisted that it reveals something other than a Nessie and may even be a hoax. Based on systematic comparisons of the photograph's subject matter to control images, an empirical case is made that the picture contains an authentic anomaly, its current criticisms are more speculative and not properly evidence-based, and the corresponding interpretations offered as alternatives are inferior. The present analysis does not conclusively identify any species in the photograph, but it underscores that any proposed explanation (whether unorthodox or conventional) for an esoteric phenomenon must be subjected to hypothesis-testing to ensure its viability and validity when applied to a specific case.

## KEYWORDS

Empiricism, hypothesis-testing, Loch Ness Monster, Nessie, photographic analysis, skepticism

## INTRODUCTION

The first photograph reputedly of Scotland's famous 'Loch Ness Monster' (affectionately termed 'Nessie' in mainstream culture) was taken on 12th November 1933 around noon by a local man by the name of Hugh Gray. The term Loch Ness Monster is emphasized, because the author believes the photograph to be genuine and part of the evidence portfolio (e.g., Bauer, 1986, 2002a,b). Figure 1 shows the picture that generally circulates.

The *Scottish Daily Record* took his picture and Mr. Gray gave the following account to them, having been interviewed by Hugh Mackenzie (the future Provost of Inverness), Peter Munro representing Hugh Gray's employers at the British Aluminium Company, and a *Daily Record* staff member:



Figure 1. Hugh Gray's famous photograph of the 'Loch Ness Monster' (Whyte, 1957).



Four Sundays ago, after church I went for my usual walk near where the river enters the Loch. The Loch was like a mill pond and the sun shining brightly. An object of considerable dimensions rose out of the water not very far from where I was. I immediately got my camera ready and snapped the object which was two or three feet above the surface of the water. I did not see any head, for what I took to be the front parts were under the water, but there was considerable movement from what seemed to be the tail, the part furthest from me. The object only appeared for a few minutes then sank out of sight. (Mackenzie et al., 1933)

The tenor of the account suggests some throwing up of spray and water as portions of the body beat about the waters and hence caused some opacity around that region of the picture. Mackenzie described Gray as a man highly respected by his fellow workmen, employers, and locals. Likewise, the *Daily Record* had the negative examined by four experts who deemed it to be untampered. It caused a stir but was rejected by zoologists and faded along with general Nessie-lore as the world entered war six years later. Twenty-two years on in May 1995, Loch Ness researcher Constance Whyte visited Hugh Gray who was sticking to his story and still had vivid memories of that day, plus he also recounted five other times he claimed to have seen the monster over those decades (Whyte, 1957, p. 77).

The best-known researcher Tim Dinsdale (1961) also recounted how he visited Gray in April 1960 and described him as “a most courteous individual” (p. 88) as Gray took him to the spot of the sighting. He spoke with “complete conviction” about that day and maintained the accuracy of his account (Dinsdale, 1961, p. 88). He also added some detail of his other sightings that partly consisted of rapidly moving bow waves with no visible cause. What remains of the photograph today is uncertain. A few prints have been extant over the years, but the negative appears to be lost forever. In this Internet age, one original print scanned from a book tends to win the day and becomes the prevalent picture.

## EARLY COMMENTARY AND CRITICISMS

Zoologists of the time summarily dismissed the photograph and suggested other explanations such as a log, wreckage, or a whale, which are all reactions that do not surprise anyone familiar with the phenomenon. The popular wildlife author Maurice Burton (1961, p. 78) suggested that Gray had seen a gas-buoyed tree trunk in the water and even formulated a picture (Figure 2) to simulate how such an object could produce the image on the photograph.



**Figure 2. Maurice Burton's (1961) depiction of the 'floating tree trunk' hypothesis for H. Gray's photograph.**

Logs are often invoked as explanations for Loch Ness Monster reports, and some are indeed responsible for deceiving inexperienced observers. The light grey colour of the object is inconsistent with the darker colour of tree trunks and then there is the problem of uncritically proposing that tree debris can assume almost any shape one wishes to achieve. This is too simplistic an approach. Leaving aside Mr. Gray's un-log-like testimony, the smooth appearance of the object also dictates against the rougher texture of tree debris, and it has to be noted that this explanation has not really found favour among critics of the photograph in the ensuing decades.

Likewise, the gas-propelled tree trunk proposal suffers from the sketch in Figure 2 being hard to relate to the original photograph. Once again, the sketch is rendered to fit the theory with little consideration as to whether such an unusual trunk could achieve these effects. It has since been determined that the oligotrophic nature of Loch Ness makes the production of decomposition gas an unlikely event (Shine & Martin, 1988, p. 167). The whale theory has more mileage in that some features do look whale-like such as the large body, but others such as the long tail or neck are not consistent with a whale.

Another author, Ronald Binns (1983), had other ideas and indulged in some innuendo when he asserted that Gray was a “leg-puller” and so implied that he had hoaxed the picture (p. 96). How he came to that conclusion was rather circuitous. First, he claimed where the picture was taken should have had more foliage visible. He does not state why he assumed the tree growth had not significantly changed in the intervening 40 to 50 years. In fact, a one-inch Ordnance survey map of the area drawn up between 1921–1930 depicts the site as devoid of heavy growth at that time (OS One Inch “Popular” edition Sheet 37). Look for the white circle in the “F” of “Foyers”. A comparison Google satellite image from 2012 shows the increase in tree growth since the time of Gray's photograph (Figure 3).

A further reference by Binns (1983) to an “A. Gray” from the 30 May 1933 issue of the *Inverness Courier* is also presented as evidence. This Gray was reportedly contriving to use hooks, fish bait, and a barrel to capture the monster at



**Figure 3. Evidence suggesting a lack of foliage in the area and time period of H. Gray's photograph. Contemporaneous survey map (top) compared to modern Google satellite image (bottom).**

Foyers. Binns speculated that he may be the same Mr. Gray and hence a bit of a prankster. However, apart from being a Mr. A. Gray instead of a Mr. H. Gray, the matter can be laid to rest here. For some reason, Ronald Binns failed to mention a key fact from the article that Mr. A. Gray was stated as being a bus driver, whereas our Mr. H. Gray was a fitter at the Foyers Aluminium Works (*Daily Record*, 1933). In fact, it is likely that the A. Gray in question was Hugh Gray's brother, Alexander Gray, who tragically died in a drowning incident at Loch Ness in the 1940s (*Dundee Courier*, 1949).

Another researcher, Steuart Campbell, quotes Dinsdale as suggesting the photo looks retouched and mentions the popular theory today that the photograph shows nothing more than a dog swimming toward the camera with a stick in its mouth (Campbell, 1996, p. 36). Admittedly, Dinsdale is ambivalent about the picture and seems uncertain as to what it shows. As a result, he commits neither way to it and simply moves on. However, it is doubtful that Dinsdale regarded Gray as an outright faker given his

previous comments about him. The matter of retouching will be addressed later.

In terms of analysis, monster researcher Ted Holiday was the most enthusiastic supporter and regarded the picture as a major piece of evidence to support his idea that the monster was a giant invertebrate. In fact, he conducts a close examination of the picture which to him reveals evidence of some warts, a slime sheet, neck segmentations, and two appendages (Holiday, 1968, Plate 8). However, the clarity of the photograph is not sufficient to be that conclusive, and this is partly because the creature was throwing up spray at the time, as well as some overexposure being present on the film.

Overexposure due to defects in the camera or film as opposed to water motion can be partly determined by observing the lighter smudged areas away from the object and comparing them to suspected water features in and around the object which carry more definition and structure—this idea will be addressed below. Nevertheless, the detail on the film is superior to most Loch Ness Monster pictures and has provoked various explanations. The most recent being that it is a swan, which we will also examine in a later section. But first we can empirically test the prevailing idea that the picture merely shows a swimming dog.

### Scrutinizing the 'Swimming Dog' Interpretation

The fact that many people perceive a Labrador dog in Hugh Gray's photograph is not compelling evidence, as such reports could represent pareidolia effects. This refers to the meaningful interpretation of an ambiguous stimulus, usually visual, so that one sees an object, pattern, or meaning where none exists. This misperception or illusion certainly occurs in 'anomalous or paranormal' contexts (Brugger, 2001; Drinkwater et al., 2020; Williams et al., 2021), but everyday examples include perceived images of faces or familiar objects in cloud formations or seeing faces in inanimate objects (e.g., Wang et al., 2022). The concept further extends to allegedly 'hidden messages' in recorded music (e.g., Thorne & Himelstein, 1984) and hearing voices (mainly indistinct) or music in random noise (e.g., Alvarez Perez et al., 2017).

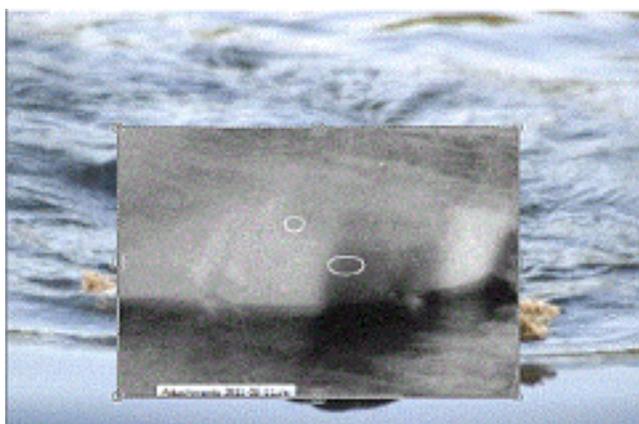
Refer back to Figure 1 to test whether you see a dog swimming toward you. Following from the above, there are three reasons why the 'swimming dog' hypothesis should be discounted. Firstly, and by way of experiment, the author sourced a good photo of a dog swimming in the same posture (see Figure 4) that could be layered with Gray's photograph using Microsoft Windows software.

The four-step comparative process is simple—(a) layer the control dog picture over the Hugh Gray image, (b) resize the Gray picture until it is the same size as the control



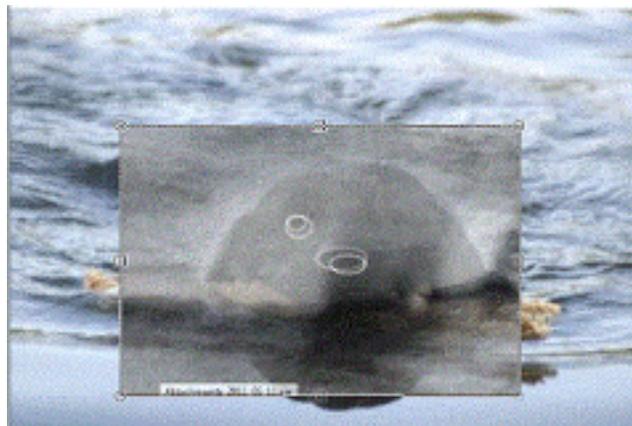
**Figure 4. Control image of a swimming dog for layered analysis with H. Gray photograph.** Courtesy: 123RF Limited under Free License.

picture, and (c) draw in circles to fix where the right eye and nose on both pictures are to align them (Figures 5 and 6):



**Figure 5. Placement of the nose and right eye of the control dog image with the H. Gray image.**

And finally, (d) use the opacity slider on the software to vary the transparency of the control dog image to compare and contrast the key areas (Figure 6):



**Figure 6. The control dog image layered on the H. Gray photograph for feature comparison.**

*What is the conclusion?* The Hugh Gray ‘dog’ appears to be missing half of its face on the right. There is no recognisable eye or ear to fill in the complete picture. There is a splash to the right where the ear seemingly should be. The other problem is that there appears to be nothing recognizable as a stick. There is a very sharp shadow line where the creature meets the water that does not compare well with the control ‘dog/stick’ picture. The other problem is that the ‘snout’ in the Gray photograph is more elongated. Note that the real dog has his muzzle raised and spread out to accommodate the stick. In fact, a dog will tend to raise its muzzle above the water to aid breathing. The supposed ‘dog’ in the Gray picture appears to have its mouth too close to the water. The final observation comparing the two layered images is the distinct water line of the object, which is far too clear-cut for what is expected of a dog swimming.

The second and most important argument against a dog is that the popularly circulated version of the Gray photograph is *not* the original. In true media fashion of the time, the image was retouched to make it more legible for their readers. This was a common practice at that time where certain features were added, removed, or emphasized for publication. This may even have involved damage to the negative as scalpels were used to achieve certain effects. It was basically the photoshop of its day and was ill-advisedly used on a genre of photograph with which they were not familiar. Contemporary researcher Rupert Gould said it was retouched in his 1934 book and this was likewise reiterated in Peter Costello’s (1975, p. 42) book where he lays the blame with the *Daily Telegraph* for touching it up to emphasize the waterline. This was likely the retouching that Dinsdale referred to (see earlier in this article).

How this was achieved exactly is unknown but increasing the contrast of the image also looks to have been

part of the process with the resulting over-emphasizing effect on the 'dog' image. It is best in these cases to get the most original image, and luckily, another print came into the hands of Maurice Burton in the 1960s which was made from glass lantern slides in 1933 for an E. Heron-Allen (Burton, 1969, p. 191). Importantly, these contact positives were made from the original negative and represent the best untouched picture of what Hugh Gray witnessed that day. It is this picture that was used in the layering experiment above (see Figure 6). Compare this with the retouched version (Figure 1) and readers might begin to appreciate the problem at hand. Unfortunately for most people, the visual cortex having conditioned itself to see a 'dog', it may be difficult to unsee it.

The final conclusive argument is the general structure of the picture. Ask yourself one key question: "*Where is the rest of the dog?*" Look again at the control dog picture in Figure 4 and note the bow wave and its back causing turbulence at the rear of the photograph. Now compare it to the Gray photograph in Figure 7. There appears to be absolutely nothing behind the supposed dog head. That is because there is arguably no dog body, and hence there is no dog head. To get a clearer vista, Figure 8 shows the Heron-Allen picture in its most uncropped form. Note the continuity of the wave patterns suggestive of no forward motion by the object in the picture.

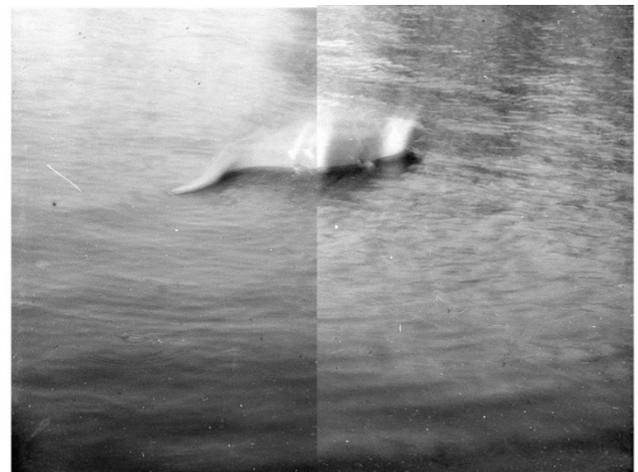
Now it may be objected that this is a double exposure of a dog, but this claim does not wash either. The *Daily Record* had the negative examined by Mr. M. Howard of Kodak and Mr. C. Clarke of the *Kodak Magazine* as a safeguard, and both stated that there was no tampering of the negative (*Daily Record*, 1933). In the unlikely event that these experts failed to spot a double exposure one would still expect the rest of the double exposure to disrupt the clean wave patterns that are visible.

The conclusion is that there is no compelling evidence to suggest that Hugh Gray photographed a swimming dog. One could experiment with more swimming dog images, but the presence and implication of the superior Heron-Allen image renders this unnecessary. Nevertheless, the problem of pareidolia effects has the potential to compound. On his own Loch Ness website, researcher Tony Harmsworth explains the dog theory to readers by producing two photographs (Harmsworth, n.d.). The first is the retouched image from the *Daily Telegraph* and the second is his further touched-up version, which for experimental purposes emphasizes some dog features for people to clearly discern this 'dog.' Harmsworth also decided that Hugh Gray owned a golden Labrador dog despite no evidence to support any such claim.

Harmsworth's altered image obviously should be disregarded but given the propensity for copying and pasting



**Figure 7. Heron-Allen's highest quality copy of H. Gray's photograph (top, courtesy: Fortean Picture Library) compared with the commonly circulated version of low-quality (bottom, rescanned from Whyte, 1957).**



**Figure 8. Uncropped version of the Heron-Allen 1933 copy of H. Gray's photograph.**

on the Internet, it will undoubtedly migrate under the false pretense of being the original photograph. In fact, it already has been characterized as such on at least one web-

site. This points out the problem with properly critiquing alternative theories today when poor quality images are used, and it is no surprise that the 'swimming dog' interpretation has persisted unchallenged for so long.

### Other Interpretations and Considerations

If some interpretations overreached in extracting a dog from the photograph, then one must question whether ardent monster believer Ted Holiday equally overreached in seeing "slime sheets and warts." As previously mentioned, Holiday advocated the idea that the creature was a huge invertebrate related to worms or slugs and proposed it was a giant relative of the extinct *Tullimonstrum Gregarium*. Quite probably Holiday had a better resolution picture to magnify given that silver-based film has higher 'dots per inch' (DPI) than modern digital cameras. However, it is evident that he was using the inferior image. This is how he interpreted the image (see Figure 9, Holiday, 1968, Plate 8):

1. Neck with head submerged.
2. Neck segmentations.
3. Anterior hump.
4. One of several wart-like vesicles.
5. Anterior parapodium.
6. Sheet of slime.
7. Posterior hump.
8. Posterior parapodium.

### 9. A wave.

Examining these interpretations in the light of the superior Heron-Allen image, it is not certain that (1) is a neck though it does appear to slip under the water. Likewise, with (2), (4), and (6). However, the light patch marked as (6) and the wave at (9) do look like lighter patches over or on the surface of the creature. I say this rather than defects on the film (such as overexposure) because the two patches create corresponding lighter reflections on the water line below in the Heron-Allen image. The two small light "balls" above (5) which were erroneously taken to form the "dog's ear" also look like interesting features, possibly water cascades? They can be more clearly seen in the Heron-Allen image above.

Holiday's parapodia (or appendages) are certainly there, but the overall shape of the animal that Holiday draws is not correct in my opinion. Thanks to this better photograph, we can see that the outline of the creature extends beyond Holiday's wave at (9) to the right. In fact, the wave is not all it seems. The 'wave' appears to be rising and then curling down to fall, but this is an illusion, as it is more likely a water spray plus something else.

Zooming in to display that part of the creature, there is ostensibly a stubby, conical-like morphology present that can be traced partly into the spray. There is also a suggestion of something like 'drips' falling from this feature and

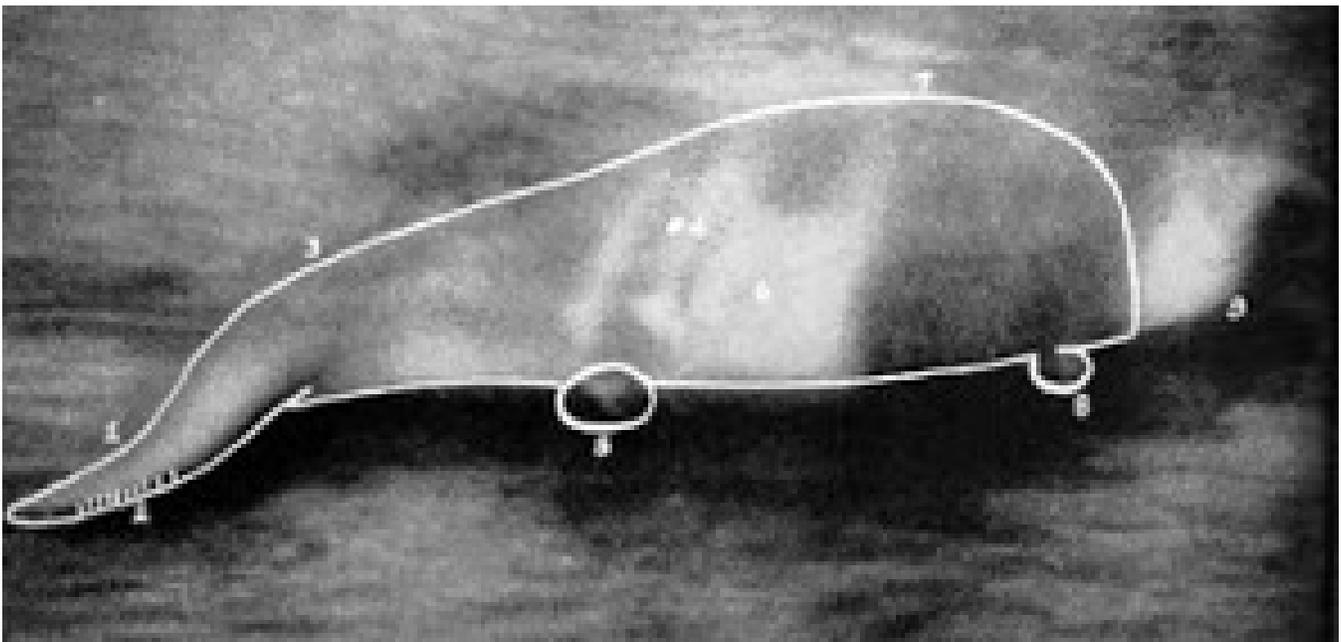


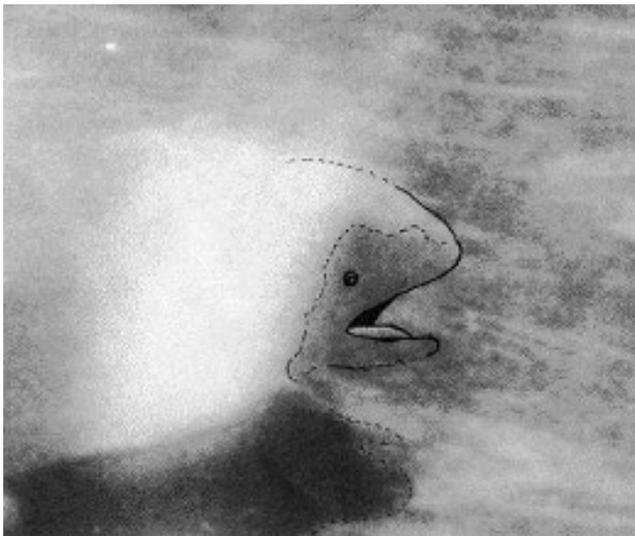
Figure 9. Holiday's (1968) interpretation of the H. Gray photograph as showing a 'huge invertebrate.'

creating their own little concentric ripples below. To confirm its solidity, Figure 10 shows that this conical feature casts a conical reflection on the water below.



**Figure 10. Apparent conical feature and associated shadow of the object in H. Gray's photograph.**

The annotated image in Figure 11 highlights the features visible. The dark interior of the mouth and what may be a tongue can be seen with the suggestion that the head is partly turned to the camera. An eye is seen above the leftmost part of the mouth. The distorted reflection below shows the outline of the head in the water.



**Figure 11. Annotations to emphasize features apparently visible regarding the object in H. Gray's photograph.**

In my opinion it produces a reflection on the water below compared to the darker body reflections, as well as its clear demarcation at the waterline. Note also the reflection

is at a different angle to the spray as one would expect. It is into this water formation that the head disappears, and it is difficult to deduce anything about a potential neck from that point onward, though clearly it cannot be of a great length given the proximity of the body. The position of the presumed eye suggests a more fish-like than cetacean appearance, since whales and dolphins have eyes beyond the end of their mouths and not above it.

What this object depicts certainly resembles some type of face with an eye and open mouth. This interpretation is less likely to be pareidolia, as it is a clearer feature than the incomplete 'dog,' and it casts a reflection on the waters. But it may be argued that it could still be a solid object exhibiting pareidolia effects. In that context, Ted Holiday classed it as a 'wave,' but he was using an inferior image, and it is difficult to see how a splash would achieve this pareidolia effect. As was stated with the floating log explanation, one has to be careful in indiscriminately invoking explanations without good cause. Not every proposed explanation is conducive to pareidolia. What kind of situation would provide the necessary fertile ground to produce such a deceptive image? In the case of the 'dog,' it was a chaotic combination of editorial retouching, poor contrast, water movement, features on the object, and some overexposure.

Practically all the theories proposed in the last six decades to explain the general picture make no provision for pareidolia in the specific 'head' portion of the image. It was an observation they could not make with the inferior photograph that was extant. We await further critical feedback on the matter as explanations such as logs, dogs, and swans were not concocted with this in mind. As for the interpretation itself, there is no compelling reason against proceeding with the assumption this is indeed the head or face of an animal, known or unknown. One could argue that no precedence from other researchers for seeing such a head casts doubt upon it. However, such an interpretation was only possible using the superior Heron-Allen image. It seems that this image only came into the public domain in 1986 when it appeared in two books. Bauer (1986, p. 14) explained in one of these books that a glass lantern slide was made for an E. Heron-Allen in 1933 and which came into the possession of Maurice Burton in the mid-1960s. Sadly, these better images were not made available for another twenty years when Steuart Campbell negotiated their release to the Fortean Picture Library. By then, almost all of the classic books on the creature had been written and next to no books were published for the next twenty years that could have offered such an interpretation.

But the 'head or face' presumption is no novel interpretation of the photograph, as the old news clipping in Figure 12 shows (*Courier Herald*, 1933).



Figure 12. *Courier Herald* (1933) clipping noting that the object in H. Gray’s photograph had a seal-like “head.”

This is repeated in another newspaper of the time which suggests a whale’s head is visible (Figure 13; *Aberdeen Press and Journal*, 1933).

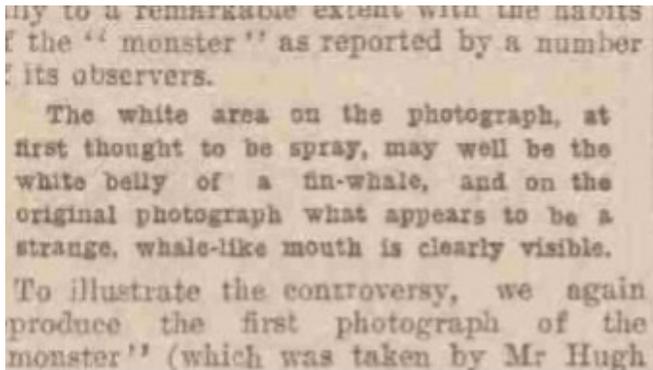


Figure 13. *Aberdeen Press and Journal* (1933) clipping that described the H. Gray photograph apparently showing a “whale-like mouth”.

Moreover, the *Daily Record* ran some readers’ opinions, and one suggested that the object bore a remarkable resemblance to a turtle (Figure 14; *Daily Record*, 1933).

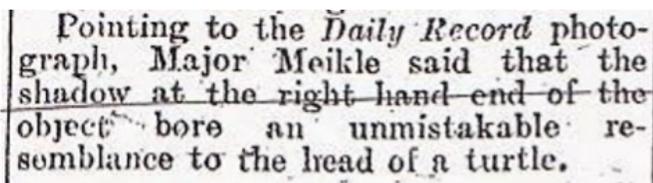


Figure 14. *Daily Record* (1933) reference to a turtle-like head on the object in the H. Gray photograph.

The photograph made international headlines and naturally people speculated about what it showed. Curiously, no one mentioned Labrador dogs with sticks in their mouth, and we ascribe that to having a superior reproduction of the photograph at hand. The first article mentioned an animal with the “body like a whale, a head like a seal, and an elongated tail” (*Daily Record*, 1933). This description, from a source shortly after the picture was taken, implies the perception of a head and thus corroborates the ‘face with an eye and open mouth’ interpretation mentioned earlier. The only difference is that this vintage description assumes it to be seal-like rather than our fish-like speculation. To that we should add the proposed whale and turtle heads. The present author is unsure what animal head it represents, but a head certainly seems to be present.

One later critic of the picture who may mention this head was Maurice Burton. As stated at the beginning, he had suggested a tree trunk as an explanation. But when he came into possession of the superior Heron-Allen prints, he altered his explanation to that of an otter rolling in the water. Now, he does not explicitly state that he perceived a head to the far-right of the image, and so it is partly speculative whether he conjectured an otter’s head was sufficient to explain what he saw. To me, it is clear that the head of an otter bears little resemblance to the head in the photograph.

But it is pointed out that Hugh Gray said he saw no head in his original account. How are these reconciled? Reviewing his testimony at the top of the page, it seems he was mistaken when he says he saw no head because “the front parts were underwater.” In other words, he took the elongated feature on the left to be the long neck as per previous eyewitness testimony. Once he decided that, what was on the right he then assumed to be the tail. The “considerable motion” he describes on that side plus the water sprayed around further obscured his sight. To quote Constance Whyte (1957), who later interviewed him:

He was looking down from a height of 30 feet or so when suddenly there was a great upheaval of the water followed by a terrific commotion about a hundred yards out, and about 40 feet of a thick rounded back and a powerful tail came in sight but the head was submerged. Contrary to reports which appeared at the time, Mr. Gray never saw the head. The creature lashed about furiously and was so enveloped in spray that further details could not be distinguished. He took five snaps before the object disappeared. Because there was so much splashing and also because he was busy with the camera, Mr. Gray did not have an opportunity to observe the creature closely. (p. 2)

So, can Hugh Gray be described as a reliable observer in this instance? The answer is *yes* and *no*. Reading his account to Whyte, it is revealed that the spray thrown up by the creature meant “further details could not be distinguished.” It is also stated that his observations were hindered because “he was busy with the camera.” This is no surprise because he was occupied with taking five photographs with a rudimentary 1930s box camera (only one image came out in development). He spent more time looking through the viewfinder than looking at the creature.

Note that this was a man who lived many years at the loch and regularly went for walks along the shoreline. It should be a given that he was familiar with the different moods of the loch and its regular inhabitants, and thus be less prone to self-deception than a tourist. However, once he initially spotted the object, assessed it was a creature of extraordinary appearance, his experience became no better than that of any other average person in zoology. His attention was torn between camera and naked eye. It is no surprise then that his normal attention to detail was compromised. That does not negate the fact that he saw a large creature in the waters, only that further details were wanting. What was revealed in the photograph compensated for that.

Whyte tells us that she re-examined the photo with Hugh Gray. Unfortunately, this was more than likely to be the inferior image published in her book which totally obscures all features to the right. Critics will often point out that humans are imperfect recording machines and that images recorded on film will often help resolve matters. In this case, the present author quite agrees with them. No dorsal fin is visible, though this is not really an issue for fish such as the eel. Thinking of an eel in this context immediately suggests Roy Mackal’s (1976, p. 140) thick-bodied eel interpretation of the creature. Putting this together gives a speculative outline of the creature’s body as shown in Figure 15.



**Figure 15. Speculative outline of the object in H. Gray’s photograph, as based on cumulative descriptions.**

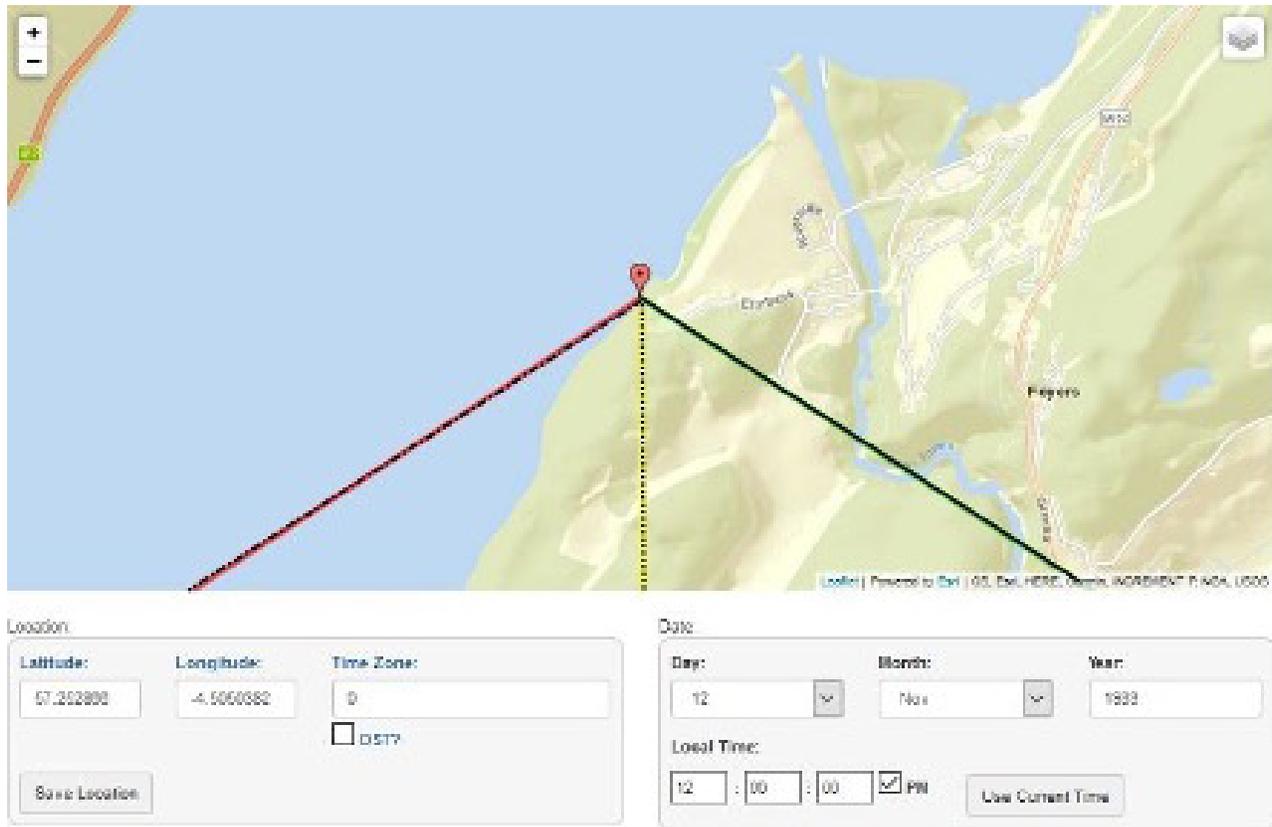
The appendages are marked as per Holiday (1968), and the present author has further indicated two possible water cascades perhaps thrown over from the other side by other appendages. Several areas of shading are observed, but it is uncertain whether they are part of the creature’s skin. The splash is again noted to the right which obscures the creature’s form before we see the opened-mouth head. How the hump curves into the water is denoted by dotted lines, as again the water spray makes its curvature into the water unclear. Notice how the dark reflection in the water clearly denotes a raised hump structure that descends toward the spray where the reflection lightens between the hump and head. There is also a lighter area of reflection between the tail and mid hump suggesting this is also an area of spray.

The creature is unusually high above the waterline, and it is unknown how it is being propelled upward as there is little evidence of flipper commotion in the waters around it. It is exactly like Hugh Gray said, i.e., it rose out of the water and sunk back down again. In fact, this is not uncommon to Nessie sightings and has led to suggestions that the creature has some form of internal buoyancy. Of course, all aquatic creatures need some form of buoyancy else they would sink to the bottom. Some achieve it through motion of appendages and other by internal volumes of gas or liquid less dense than water. This volume is regulated to cause them to rise or sink. Whether this is being achieved by flippers or other means cannot be ascertained from the photograph.

### Some Objections Answered

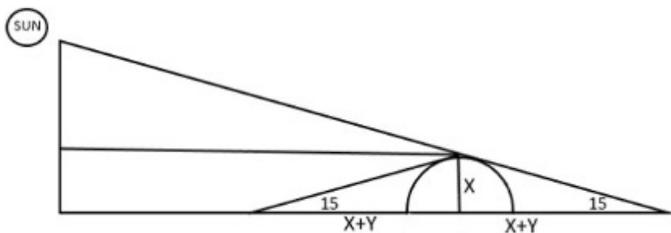
It could be objected that if Mr. Gray was where he indicated at the stated date and time, then the reflection is in the wrong place. The sun would be roughly to his left and hence the reflection should be more to the right on the image. It should be pointed out that the question does concern a reflection rather than a shadow. The peaty waters of Loch Ness ensure a reflective surface for objects on it. The shadow would be behind the creature and out of view. Naturally this raises the question of not so much Hugh Gray’s position on the shore but rather his orientation with respect to the sun and the creature. We can be confident where he stood and where the sun was, but the location of the creature is less certain.

The use of the NOAA Solar Calculator (<https://gml.noaa.gov/grad/solcalc>) reveals more of the position of the sun on that bright November day (see Figure 16). There are three lines: (a) the direction of sunrise (right), (b) the direction at the time of the sighting (center), and finally (c) at sunset (left).



**Figure 16. Position of the sun at the time and place of H. Gray’s sighting at Loch Ness.**

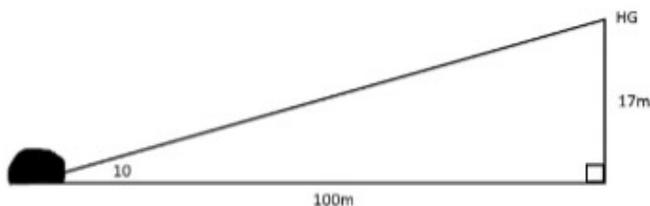
The geographical position is well-known given the accounts in Whyte (1957, p. 2) and Holiday (1968, p. 26). The azimuth of the sun is given as 179° and the elevation as 15°. Based on the shape of the reflection, it can be inferred that Hugh Gray photographed the creature with the sun behind him, so he and the creature were positioned somewhere along the direction of the dotted line in Figure 16. However, one should not assume that the reflection is a perfect representation of the creature’s dimensions, but it can help to make some deductions. Firstly, reflections lengthen and shorten according to the sun’s position. At a solar elevation of 15° this gives us the rough diagram in Figure 17.



**Figure 17. Calculating the position of the object in H. Gray’s photograph relative to the sun.**

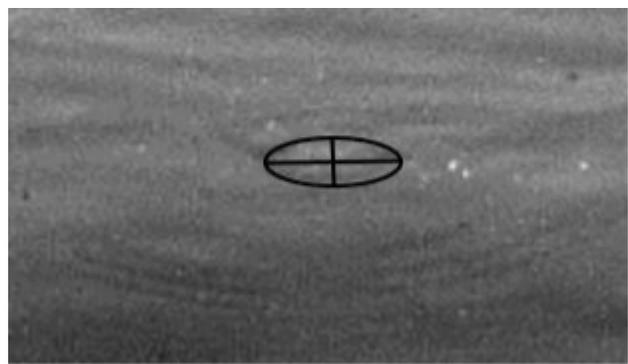
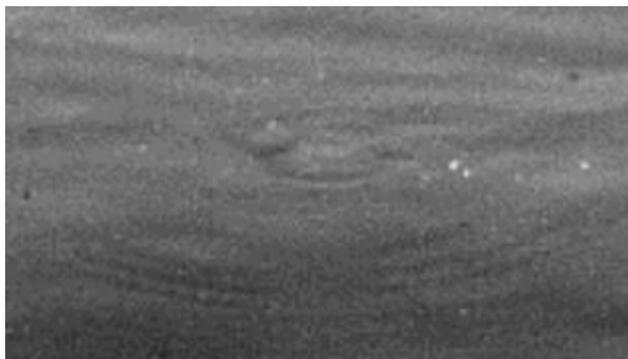
Here,  $x$  is the height of the creature above the water and  $y$  is the length of the reflection. The angle at the apex is our 15°. The one assumption made is that the creature formed a roughly semicircular shape out of the water when viewed laterally. The analysis can be done on this and the ratio  $y:x$  is 2.7:1. That is, the reflection  $y$  is 2.7 times longer than the height of the animal out of the water. But you then look at the photograph and it is evident that the reflection is not 2.7 times longer than the apparent shape of the creature. This is due to the angle at which the observer viewed the object. Imagine the observer was directly over the creature. In this case, the witness would see the entire reflection length at 2.7 times the height of the creature. At the opposite extreme, if the witness was at the same eye level as the animal, no reflection would be seen. So, at this range from 90° to 0° was an angle at which the observer viewed the creature, and which would proportionately present a foreshortened reflection.

Now from what the author can ascertain from Holiday (1968) and Whyte’s (1957) information, Hugh Gray estimated that he saw the creature from about 100 yards and was about 50 feet above it. If this was accurate, Figure 18 yields the resulting approximate diagram (in meters).



**Figure 18. Hugh Gray's approximated viewing position based on published information.**

This gives us an angle of incidence of about  $10^\circ$  as a first estimate. We then divide this by  $90^\circ$  and then multiply it by the ratio of 2.7:1, and the apparent reflection ratio is now only about 0.3:1 of the height of the creature. Looking at the photograph of the suggested height of the creature and the extent of the reflection, we can see that this estimate is not quite there. This implies that Hugh Gray must have mis-estimated something. However, another calculation of the observer angle can be deduced from the photograph itself. In the original Heron-Allen image there is a circular ripple (Figure 19) that appears in the bottom left of the photograph and is shown here along with a superimposed ellipse and axes.



**Figure 19. Circular ripple shown in H. Gray photograph (top) with ellipse and axes superimposed (bottom).**

Applying basic mathematics to the axes suggests that Hugh Gray's observation angle was up to  $28^\circ$  and not the author's previous estimate of  $10^\circ$ , meaning that the creature was no less than 32 meters from the observer. The adjusted apparent reflection size becomes 0.84:1 instead of 0.30:1, which is more in keeping with the photograph. Since the creature is farther away in the picture than the elliptical ripple, however, 50 meters looks to be a closer estimate of the actual distance.

Another objection is that Gray's picture would have included some far shoreline. The problem with this argument is two-fold. Firstly, we do not have the complete negative and what has passed down to us is likely an enlargement of a cropped area of the negative. One prime example from that time is the famous 'Surgeon's Photograph,' which was cropped and enlarged to show only the object of interest. Once the original uncropped print was found decades later, the remote shoreline became visible. Even to this day, media outlets crop pictures to zoom in on the 'juicy bits.' Thus, talk of shoreline on the original is open to debate. Secondly, when the present author visited the site of the Gray photograph (Figure 20), it was simple to photograph a spot 200-meters away looking in that general direction and which did not include any shoreline. To be fair, however, digital cameras have different parameters from Gray's box camera.



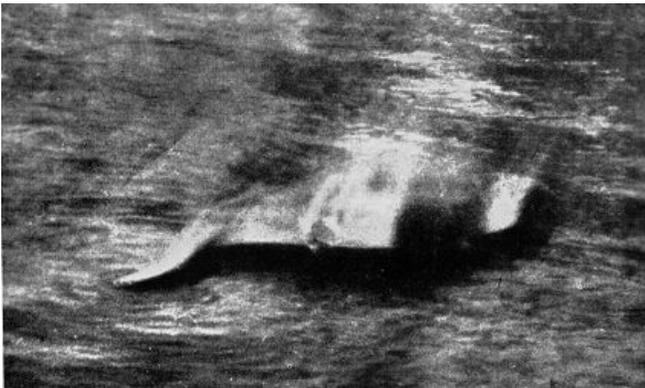
**Figure 20. Modern-day site of the H. Gray photograph Courtesy of the author.**

Finally, the cropped version of the photograph picture has led some to claim that it was not even taken at Loch Ness, which obviously plants the seed of doubt (Binns, 1983, p. 99). This is a common reply when there is lack of known foreground and background objects in a picture. This is more psychological than forensic, as it places an unwarranted burden of proof on those who accept the tes-

timony of Hugh Gray. Rather, it should equally be the case of asking for a reason why it should not have been taken at Loch Ness. After all, cannot pictures be equally faked at Loch Ness than anywhere else? Perhaps the uncropped picture will turn up one day, until then there is no reason to doubt it was taken at the loch.

### The 'Swan' Interpretation

A newer speculation asserts that Gray's photograph shows a swan (Naish, 2016). The proposer was somewhat contradictory about the image in that at one point he spoke of the "sheer ambiguity" of the picture yet later stated that it is "almost certainly" a swan. However, this latest hypothesis has several problems not unlike the 'swimming dog' interpretation. Observe the two images in Figure 21 that were published in defense of the swan re-interpretation. The top photograph is the inferior version of the Gray photograph, whereas the bottom picture is an idealized drawing of a swan in the 'Hugh Gray' position. We would be invited to recognize the apparently common features, i.e., the long neck, the body, the white-feathered tip at the posterior, and the partially submerged rear leg coinciding with one of the bulbous objects on the waterline.



**Figure 21. The Hugh Gray photograph (top) artistically re-imagined as depicting a diving swan (bottom).**

When one studies this pair of images, several critical questions came to mind. The first was, "Why was this version of the Gray photograph used?" It is poor quality, where-

as the Heron-Allen image is far better. Using this superior version of the picture, we can discern some features that undermine Naish's (2016) swan interpretation. Zooming to the far right-side, features become decidedly un-swan like. In particular, the observer is immediately confronted with the fish-like head that was previously discussed. Also, there is the area resolved as a spray of water heading up vertically which is difficult to reconcile with a swan in this proposed posture. Likewise, the partially submerged rear leg coinciding with one of the bulbous objects on the waterline fails to account for the second bulbous object farther to the left. Nevertheless, could the pointed tip of a swan produce a pareidolia effect, looking like a fish head? The photograph below of a real swan dipping into the water (Figure 22) suggests the tail tip bears no resemblance to an illusory fish-like head or for that matter the Hugh Gray photo as a whole.



**Figure 22. Photograph of a real diving swan (Unknown, 2022).**

A further examination of the superior Heron-Allen image reveals another problem, i.e., "Where are the feathers?" There is nothing visible that suggests feathers or anything avian. On the contrary, the image suggests a surface that is smoother in appearance and contour with no indication of differentiation of feathered regions. My own opinion on this is that if the superior image had been used, it would have rendered the swan theory inadequate. However, the inferior—and more ambiguous—image that was used better suited their case. Darren Naish and his advisers on this matter know that this superior image exists, so its exclusion is puzzling. After all, Steuart Campbell (1996) featured it decades ago in his popular book.

A third question was, "Why did they use a drawing of a swan instead of a real one?" Sketches are problematic because they can be drawn to fit any pre-conceived concept. Thus, it is no wonder that the 'proposed swan' resembles

the Hugh Gray object. But software can likewise overlay the swan drawing over photographic subject as detailed earlier. The result shows that the two images do not fit (Figure 23). The problem is apparent when the neck and shoulder are aligned to fit in proportion. Hugh Gray's creature is far more extended than the hypothetical swan and no amount of resizing could get the two images to line up adequately. At least when a sketch was used earlier for the proposed fish-like head, it bore a good resemblance to the original. As it turns out, another layer of complexity is now required—it was a deliberate double exposure by Hugh Gray to produce this strange image. This argument was literally on shaky ground; however, when one Loch Ness researcher (Harmsworth, 2010, p. 83) said that the image suggested evidence of camera shake, making a perfect alignment of the two swan exposures highly unlikely and indicating that no mandatory tripod was involved in this alleged deception. However, it is unclear whether the box camera that Gray used could have accommodated a tripod. It must also be remembered that, as with the claim that the alleged 'dog' was a result of a double exposure, the same applies here as the photographic experts who examined the camera and negatives at the time saw no evidence of tampering. Obviously, the whole matter could be brought to a head if the proponents of the swan theory created a test photograph using the techniques that they accuse

Hugh Gray of employing. Naturally, only resources available in 1933 could be used.

## DISCUSSION

The Loch Ness Monster ostensibly posed for its first photograph in November 1933. Yet despite 88 years of scrutiny, it seems that the original 'head' interpretation has gone unnoticed virtually all that time. This is apparently due to the combination of (a) the press of that era touching-up the image, (b) the uncritical 'dog' theory holding sway for at least 20 years, and (c) various Loch Ness researchers of note leading other paths of interpretation or just ignoring the picture. Indeed, empirical analysis does not support the frequently touted conventional explanations for the Hugh Gray photograph, namely, that it shows a swimming dog or a diving swan. In fact, detailed and comprehensive study instead reveals that the documented object more likely has a conical shape and associated features that suggest a head of a living animal. The appearance is arguably consistent with an eel or perhaps even a turtle, which have been both discussed as potential candidates for the Loch Ness Monster (see, e.g., Bauer, 2020; University of Otago, 2019). Of course, the photograph might also depict exactly what the photographer claimed to have seen, i.e., an anomalous creature of considerable size.



**Figure 23.** The diving swan drawing layered on the H. Gray photograph for feature comparison.

The controversy over Hugh Gray's photograph illustrates both the *substantive* and *sociopolitical* difficulties of investigating topics on the margins of science (see Bauer, 2001, pp. 77–79). Substantive difficulties include the evanescent nature of important material, e.g., original negatives or prints of photographs are lost and important actors and witnesses may no longer be available. The sociopolitical difficulties include typically a highly polarized audience, i.e., confirmed believers versus insistent disbelievers who improperly call themselves 'skeptics.' There is a notable lack of engagement between the two groups, let alone any constructive adversarial collaboration as seen in other areas of mainstream academia and edge science (e.g., Bateman et al., 2005; Cowan et al., 2020; Honorton & Hyman, 1986; Laythe & Houran, 2022). A form of skepticism often confidently presents untested speculations and sometimes even levies ad hominem attacks. Rather than make a sustainable case that the evidence presented by proponents is inconclusive or incorrect, such critics insist that believers are simply wrong and thereby assert certainty where there is none (Bauer, 2014).

Quite often photographs are presented as objective evidence, as opposed to the subjective accounts of recipients. However, critics are just as likely as believers to interpret things in photographs that are simply not there and merely feed confirmation bias. Attempts to reproduce classic photographs to validate theories can also be a slave of bias when resources above and beyond what would be reasonably expected of the original witnesses are employed in the search of an impressive twin image. In reality, almost any image from the past can be reproduced, rendering their use a moot point. The nature and quality of skepticism have accordingly diminished when explanations are presented as probabilities or certainties without proper due diligence on their viability or validity. Indeed, any claim should require evidence before its acceptance. The same applies to the testing of competing theories for a given anomaly, irrespective of whether those propositions are grounded in conventional thinking or tethered to edge science. This is particularly crucial when dealing with information or evidence that carries a high risk of error in reasoning. Accordingly, it is strongly recommended that skeptical commentators refrain from publishing or otherwise disseminating dogmatic explanatory statements about anomalies without (a) offering direct evidence in support, or (b) emphasizing caveats about their untested speculations. Anything less could well undermine public education in science. It also causes one to wonder if pseudo-skeptics truly believe their own rhetoric or whether it is all a matter of getting rid of troublesome photographs and therefore that troublesome creature in a distant loch.

## IMPLICATIONS AND APPLICATIONS

The controversy around interpretations of the Hugh Gray photograph could be constructively leveraged to advance studies of individual differences in pareidolia, and especially how they influence bottom-up and top-down factors in perceptual processing (see e.g., Caruana & Seymour, 2021; Salge et al., 2021; Zhou & Meng, 2020). As noted earlier, confirmation biases and other confounds that promote pareidolia have been identified in believers of esoteric ideas or phenomena (Brugger, 2001; Drinkwater et al., 2020; Houran & Williams, 1998; Williams et al., 2021). However, as acolytes of 'scientism' (Truzzi, 1987), pseudo-skeptics are likewise expected to be susceptible to these same effects and pressures as demonstrated by the present research (for a discussion, see Drinkwater et al., 2019). Thus, future research using the Gray picture (or related photographs) in stimulus-response exercises might affirm that *uncritical disbelievers* have attitudes and behaviors similar to *uncritical believers*. Assessing an image such as this from 88 years ago will be different from one taken in the present time. The tools are different, and the main actors are long dead. Stated facts are harder to verify and the forensic trail has gone very cold. It is perhaps their iconic status that motivates researchers to either pull them down or keep them aloft. In that sense, the driving factors can vary from the present-day evidence and the need to avoid bias and prejudice is even greater.

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