# THE AMAZING SAMA-BAJAU DIVERS

## Evolutionists claim these people have evolved a special trait. What are the facts?

**Michael Thompson**

AMONG THE islands of Indonesia, Malaysia, and the Philippines, there is a people group with the reputation of being masters of the sea. For over 500 years the Bajau people (who usually call themselves 'Sama'[1]) have lived a nomadic lifestyle closely associated with the ocean. They live mostly in houseboats and stilt houses over tidal waters (fig. 1). From there they venture out to sea to hunt food, diving to incredible depths of up to 70 m (230 ft) while holding their breath. This seemingly superhuman ability has intrigued scientists. Does this come from just their training methods or lifestyle, or is it also genetic?

### Freediving stars

Bajau are best known for their spearfishing ability (photo above). They are expert freedivers (diving without an oxygen tank), able to hold their breath for minutes at a time while hunting and gathering food underwater.[2] Being able to reach such astonishing depths has allowed them to access ocean resources



**Fig. 1.** A Bajau village just off the coast of Borneo



**Fig. 2.** Sama-Bajau people celebrating in colourful traditional attire


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others couldn't.[3] In addition to catching their own food and earning income by selling the surplus, the Bajau have been known to harvest high-priced items like pearls.

Recent research has shown that many Bajau likely have a genetic advantage for long breath holds.[4] Ultrasound measurements have shown that whether they are practising divers or non-divers, the Bajau have larger spleens on average than most people. Genetic testing also revealed that many of them have a particular allele (version) of the thyroid hormone regulation gene (*PDE10A*), which correlates with larger spleens.[3] (Let's call this allele 'BV' for *Bajau Variant*.)

### How a larger spleen helps

Apart from its other important roles, our spleen acts as a store of oxygenated red blood cells (RBCs). During a long breath hold, the spleen contracts. This contraction releases stored RBCs into the circulation, increasing oxygen content by about 2.8%–9.6%.[3] More available oxygen means a potentially longer breath hold (see 'Modern freediving', p. 38). The extra cells may also help the body recover more quickly after diving. Having a bigger spleen means it can store, and thus release, more of these cells. Modern freedivers do breath-hold training, which can lead to increase of spleen size. However, what is significant about the Bajau people is that both the diving people and the non-diving people (who haven't trained for freediving) have larger spleens, indicating a genetic factor.

### Natural selection in action

One can see how the BV could give a diver a reproductive advantage. Freediving for a living has its hazards, especially at the poorly sunlit depths the Bajau routinely reach. The diver can become wedged or disoriented while searching for food in rock fissures or on the underside of large, potentially shifting rocks. Such situations, even entanglement in old nets and similar, require time and presence of mind to overcome. Running low on oxygen increases the likelihood of panic—which in turn leads to more oxygen consumption. The extra oxygen the BV ensures will obviously improve the odds of survival, making it more likely for that gene to be passed on. Divers with longer breath holds would also be more likely successful in their pursuit of pearls, etc. The relatively greater prosperity might make it more likely that BV possessors will win out in the marriage stakes. They may also be able to afford better health care for their family. Both would be conducive to the transmission of their genes. So, it's no surprise that this allele is frequently found in the Bajau.

### But is it evolution?

This variant is likely from a mutation (an accidental mistake in copying DNA) at some point in human history, and not a gene originally present. The Bajau thus demonstrate the way most today claim evolution happened—mutational change favoured by natural selection.

Importantly, though, evolution requires an *encyclopedic* amount of new information to have come about through mutations. If microbes became mahogany trees and microbiologists, then totally new structures and functions would have to have arisen countless times in the process. It's important, then, to look closely at any claimed example of evolution, to see if the nature of a mutation fits the bill. Losses of structure or function, from damage to existing genes, obviously do not qualify as evolution.

So, it's not enough to show that a mutation gives a benefit; even a defect or loss could be beneficial in certain circumstances. For example, the mutational loss of wings in the Galápagos flightless cormorant.[5] This makes the bird unable to fly, but a more efficient swimmer for hunting underwater. Also, on very windy islands like the Galápagos, it takes away the risk of being blown out to sea. But this is "a *loss* of genetic information. Goo-to-you evolution would require changes that result in new genetic information."[5]

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### Large spleens a 'side-effect' of the changes

The gene *PDE10A* regulates (suppresses) thyroid hormone (TH) production. Crucially, the BV *inhibits* (reduces) this gene's usual function, as random changes are highly likely to do. (It's much easier for an accidental change to break something than make something.) The resultant *loss* of control causes more TH production, which in turn is most likely the cause of a greater spleen size.[3]

Experiments with mice were done to confirm the connection between alteration of this gene (*PDE10A*) and spleen size.[6] To replicate the effects of the BV allele, mice were injected with a substance which similarly inhibits *PDE10A*. The injected mice all developed larger spleens. They also had a negative side-effect of low body weight. This is because an excess of TH increases basal metabolic rate. This means calories are churned through faster, causing an organism to lose both fat and muscle. Although this

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## Modern freediving

While most people avoid having to hold their breath for a long time, some train specifically for it. In deep waters, freedivers set up a length of rope with a buoy on one end and a weight on the other. They use it to measure how deep they can dive on a single breath. The current world record for freediving with bi-fins (a flipper for each foot) is just over 120m deep. This required the diver to hold his breath for about three and a half minutes while kicking (much harder than without moving).[1] Freediving is growing in popularity because of the apparent benefits of learning to control your thoughts and relax.

To achieve such long breath holds, freedivers do a lot of breath hold training (often on land). This is to increase their tolerance to $CO_2$ (prolonging the time before they have the 'urge to breathe'). Also, to increase efficiency of $O_2$ use in the body (e.g., getting very good at relaxing unnecessary muscles, which requires a very calm mind. Muscle activity consumes a lot of oxygen).

The 'urge to breathe' sensation when holding your breath is based on high $CO_2$ levels rather than low $O_2$ levels. As $O_2$ is consumed, $CO_2$ builds up. Even though lack of oxygen is what causes someone to black out, the body uses blood $CO_2$ levels to determine when to breathe. The natural 'urge to breathe' system based on high $CO_2$ levels generally kicks in well before the blackout stage—a well-designed mechanism incorporating safety margins. A lot of breath-hold training revolves around building a mental resilience to $CO_2$ buildup to delay and even push through the 'urge to breathe'. The danger, however, is that ignoring this urge effectively ignores your body's natural safety mechanism—meaning you get much closer to blacking out without realizing it. A blackout underwater can readily lead to death or brain damage. In the US, about 1 in 500 freedivers die every year.[2]


1. Liang, J., Vertical Blue 2023 Day 1: Arnaud Jerald Sets New Freediving World Record, deeperblue.com, 21 July 2023. The current record for breath holding while simply floating in water is just over 11 minutes.
2. Van Niekerk, G., The shocking reality of freediving death rates, apnealogy.com, 6 Nov 2019.



**Fig. 3.** Haenyeo freedivers from South Korea. Many of the women who keep this ancient freediving way of life going are over 70 years old—and are still very active in diving and collecting seafood.

is normally a negative in population groups (harder to survive a famine with high metabolism), it might benefit the Bajau. Their very-high-protein seafood diet would likely mean that the weight loss would mostly be body fat, not muscle. Fat is lighter than muscle. Less fat therefore makes them less buoyant, meaning diving is easier.

Not enough research has been done to determine whether those with the BV experience other clinical problems common to people with excess TH—among them anxiety, heat intolerance, palpitations, and in some cases more serious heart problems.[7]

Interestingly, despite its benefits for their lifestyle, still only 37.1% of the Bajau have the BV allele. It is also found in other (non-diving) people groups in Asia but at a significantly lower rate; 6.7% in Saluans, another Austronesian group, and 3.0% in Han Chinese.[3] This suggests that the benefits of inheriting this allele really only outweigh the downsides when coupled with the Bajau people's unique freediving lifestyle—and then only to some extent.

A more recent study was done of a different diving population indigenous to South Korea, known as the Haenyeo. These people have a generational freediving culture similar to the Bajau (fig. 3).[8] Their spleen sizes were measured and were not significantly greater than other people.

## The likely scenario

The evidence to date is consistent with the following: The gene *PDE10A* is meant to control thyroid hormone production. The BV allele of this gene is the mutated (damaged) form. The downsides from this damaged gene are why selection keeps it at a fairly low level—except in a population with a very specific and unique lifestyle, where the downsides are traded off against a definite selective advantage. Even in that group, the disadvantages are likely the reason why selection has kept it to just over a third of the population. This all makes good sense in a creation/Fall scenario.

## In conclusion

This interesting discovery is helpful in explaining mutation and natural selection, something which is a part of creationist biological models, too. But the change to the gene is more or less the reverse of what would be required to support the plausibility of grand-scale evolution.

## References and notes


1.. They are better known by the name 'Bajau' given by outsiders.
2. South East Asia's extraordinary freedivers (video by Anirudh Ganapathy), bbc.com, 23 Jul 2022.
3. Ilardo, M. *et al*., Physiological and genetic adaptations to diving in Sea Nomads, *Cell* **173**(3):569–580, 2018.
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5. Sanders, L. and Sarfati, J., The birds of the Galápagos, *Creation* **31**(3):28–31, 2009; creation.com/galapagos-birds.
6. Ilardo, M. *et al*., An erythropoietin-independent mechanism of erythrocytic precursor proliferation underlies hypoxia tolerance in Sea Nomads, *Front. Physiol.* **12**:760851, 2022.
7. Mayo Clinic Staff, Hyperthyroidism, mayoclinic.org, 30 Nov 2022.
8. Aguilar-Gómez, D. *et al*. Genetic and training adaptations in the Haenyeo divers of Jeju, Korea, *Cell Reports* **44**(5):115577, 2025.



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