Goldschmidt 2025 Abstract
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By discharging iron-rich mine wastewater into the bay, they were able to recreate the marine environment that existed 2 billion years ago when banded iron ore formed, and shed light on the impact on modern seaweed, shellfish and fish.

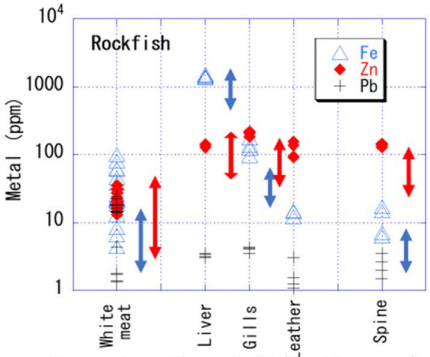
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Two billion years ago, we could not see much of the life that inhabited the oceans today, but it is possible that they have genetically inherited the environment of the past. It is well known that iron spraying affects the habitat of marine life. Acidic wastewater containing a large amount of iron ions from a closed mine in Shirahama Town on the west coast of the Kii Peninsula in central Japan flowed into a small bay (Kanayama Bay), reproducing the paleoenvironment in which iron oxides precipitated. The iron ion and zinc ion concentrations were 100 mg/l, the pH was 3, and the annual loading of iron and zinc was about 1 ton.

Biological surveys were conducted in this environment. The iron flowing into the seawater is oxidized, and seawater always contains iron oxides, and iron is precipitated on the seabed. Zinc, on the other hand, does not precipitate even after entering the ocean, but exists in the state of ions. As a result, no oysters, barnacles, turtle hands, sea anemones, or sea urchins were seen in the bay where iron precipitation was found. Outside the bay, on the other hand, these creatures were common.

The seaweed in the bay was inhabited by some species found outside the bay, and no special seaweed was found in the bay. The table shows the iron, zinc, manganese, and lead concentrations of seaweed for each brown algae, red algae, and green algae. Comparisons were made with the concentrations of common seaweed on the north and south sides of Kanayama Bay. The iron and zinc concentrations in the seaweed in Kanayama Bay are extremely high. Similarly, lead and manganese are also high. However, the fish that live in the bay do not have high concentrations of heavy metals. From this, when the concentration of heavy metals in seaweed is high, the concentration of heavy metals in the body is also high. However, seaweed can live even if the concentration of iron and zinc reaches several percent. On the other hand, fish also eat seaweed, but the heavy metals in their bodies do not get high.



Comparing with north Kii (double arrow), moveless rockfish
Normal Fe and Zn concentration in body

Conclusion metal concentration character for seaweed

	site	brown	red	green
Zn	north	5 ~ 200	10 ~ 200	7~ 70
	south	3 ~ 200	4 ~ 1,000	5 ~ 200
	Kan	**1,000~ 30,000**	**2,000~ 30,000**	**500~ 30,000**
Fe	north	30~3,000	20~3,000	200~ 7,000
	south	20~800	10~3,000	80~ 4,000
	Kan	**400~ 10,000**	**2,000~ 50,000**	**1,000 ~ 200,000**
Mn	north	4 ~ 300	5 ~ 400	20 ~ 700
	south	2 ~ 400	1 ~ 300	6 ~ 200
	Kan	7~500	**40~8,000**	**4~ 8,000**
Pb	north	0.2 ~ 20	0.3 ~ 40	2 ~ 40
	south	0.2 ~ 10	0.1 ~ 10	0.5 ~ 20
	Kan	**4 ~ 400**	**30~1,000**	**4~ 1,000**