



The CLEAN PAPER

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Makabartar whale a teku mai zurfi tarihi ne na shekaru miliyan biyar

Wata makalar Nature ta ruwaito babban tarin gawarwaki da burbushin whale a Yankin Diamantina na kudu maso gabashin Tekun Indiya: al'ummun halittu biyar na zamani a gawar whale, daruruwan ragowar burbushin cetacean, da shekarun isotope na strontium da suka koma kusan miliyan 5.3. Abin ban mamaki ba wai whale sun zabi wurin mutuwa ba ne, ko kuma bala'i guda daya ya yi makabarta. Hujjar tana nuna tarihi mai zurfi da dadewa wanda mutuwar whale ta yau da kullum, gawarwakin da ke nutsewa, wahalar neman abinci ta whale masu baki, fasalin kasan teku da adanawa na musamman suka gina. Yana bude tagar da ba kasafai ake samu ba zuwa tsarin halittun gawar whale a teku mai zurfi; ba ya nufin an riga an zana ko fahimci teku mai zurfi.

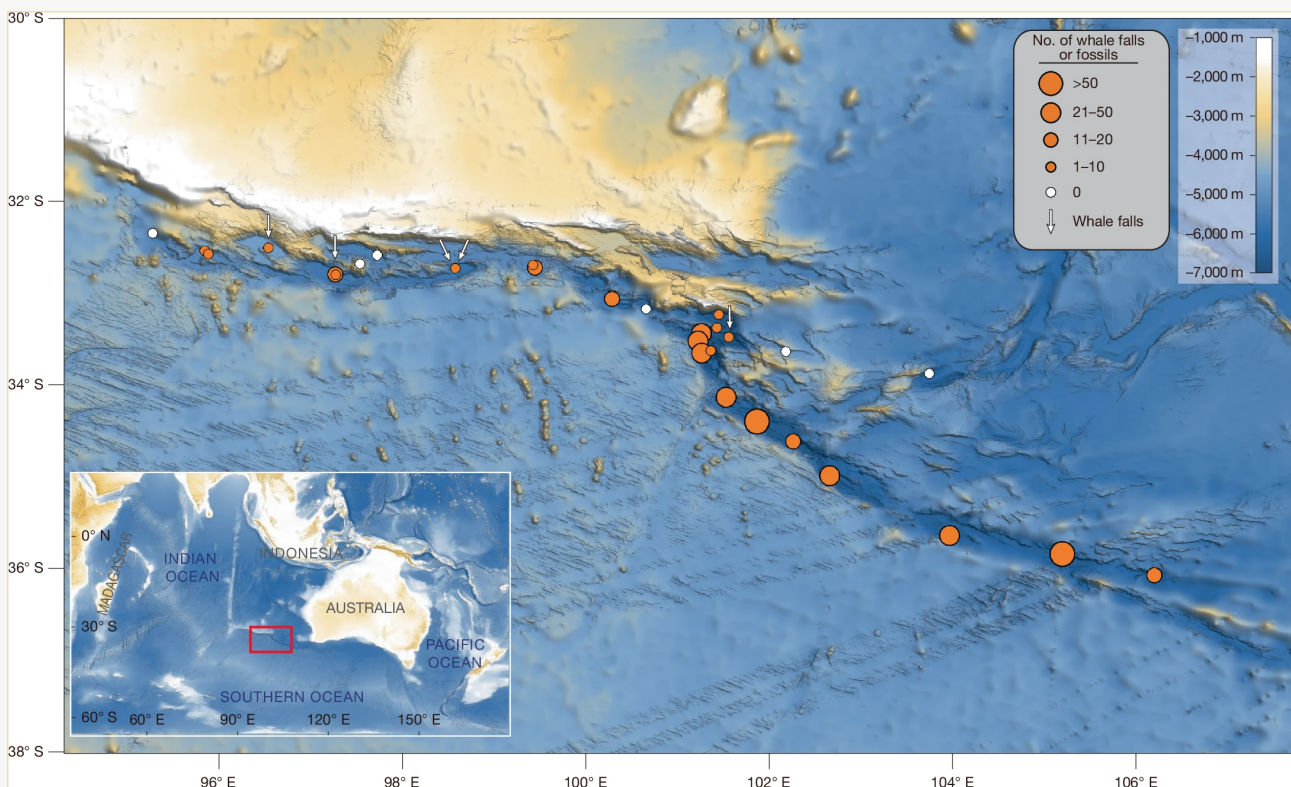
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Kasan teku ya adana kasusuwan

Galibin gawarwakin kifayen whale da suka nutse suna facewa cikin wani lissafi mai duhu. Whale ya mutu, ya nutse, ya ciyar da dimbin halittun teku mai zurfi na wani lokaci, sannan ragowar tarihinsa ya watse, ya binne ko a cinye shi. Masana kimiyya sun san cewa wuraren da gawar whale ta fadi suna zama mabuɓɓugar rayuwa, amma tarihin da aka adana kadan ne: mafi yawan wuraren da aka sani suna ware, ba su kai zurfin manyan ramukan teku ba, ko kuma sun yi sabo sosai da ba za su fadi abubuwa da yawa game da zamanin da ba.

Yankin Diamantina ya sauya girman wannan matsala. A cikin sabuwar makalar Nature, Xi-aotong Peng, Peng Zhou, Xikun Song, Giovanni Bianucci, Mengran Du da abokan aikinsu sun ruwaito dogon tarin gawarwaki da burbushin whale a kudu maso gabashin Tekun Indiya. Wurin ya mika kusan kilomita 1,200 a kasan teku, a zurfin kusan mita 4,600–7,000. A nutsewa 32 da jirgin bincike mai daukar mutane na *Fendouzhe*, tawagar ta rubuta wurare 485 na burbushin whale da gawarwakin da har yanzu suke dauke da al'ummun halittu; a takaitaccen bayanin makalar kuma sun bayyana al'ummun halittu biyar na zamani a gawar whale tare da burbushin dabbobin cetacean 476. Wadannan kididdiga biyu ne daban a cikin makalar, ba adadin da za a haɗa kai tsaye ba: 485 shi ne lissafin wurare, 476 kuma shi ne yawan burbushin cetacean da aka yi amfani da shi a takaitaccen bayani.



Hoto na 1 na Nature yana nuna taswirar abubuwan da aka gani a Yankin Diamantina: da'irori masu ruwan lemu suna nuna nutsewar da aka ga burbushin whale ko gawarwaki, girman da'ira yana nuna yawan ragowar whale da aka rubuta, fararen kibiyoyi suna nuna gawarwakin da suke matakin amfani da sulfur, fararen da'irori kuma suna nuna nutsewar da ba a ga ragowar whale ba. An sake nuna hoton gaba daya ba tare da sauyi ba: ba a yanke shi, ba a dora wani abu a kai, ba a sake masa lakabi, ba a canja launi kuma ba a sake zana shi ba.

Peng et al. / Nature 654, 978-983 (2026), DOI 10.1038/s41586-026-10546-z · CC BY-NC-ND 4.0; base map: GMRT — Ryan et al., Geochem. Geophys. Geosyst. 10, Q03014 (2009) · CC BY 4.0 CC BY-NC-ND 4.0



Whale masu baki irin na True dangi ne masu rai na whale masu nutsewa zuwa zurfi da makalar ta tattauna. Wannan hoton na karin mahalli ne, ba ɗaya daga burbushin Diamantina ba: manufar ita ce waɗannan whale halittu ne masu wuyar gani da suke neman abinci a zurfi, don haka tarihin kasusuwansu a kasan teku zai iya adana shaidar da lura daga saman ruwa kan rasa.

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Ragowar da ya fi tsufa da aka auna ya kai shekaru miliyan 5.26, shi ya sa makalar ta kira wurin makabartar whale ta shekaru miliyan 5.3. Wannan suna ne mai jan hankali. Kuma shi ne sunan da ya fi bukatar kulawa.

Ba hujja ba ce cewa whale sun je can da gangan domin su mutu. Ba wani bala'i guda ɗaya da ya kashe da yawa ba ne. Ba kuma makabarta ba ce a ma'anar ɗan Adam. Wuri ne da gawarwaki da kasusuwa suka taru, suka kasance a fili, suka koma ma'adanai kuma suka zama abin da za a iya karantawa.

Abin da marubutan suka yi

- Sun binciki Yankin Diamantina da nutsewa 32 na jirgin *Fendouzhe* daga jirgin ruwa na bincike R/V *Tansuoyihao*.
- Sun rubuta burbushin whale da al'ummun halittu a gawarwaki a tsawon kusan kilomita 1,200 na kasan teku.
- Sun yi amfani da bidiyon da aka ɗauka a wurin da samfurorin da aka tattara domin gano al'ummun da ke rayuwa a gawarwakin whale na zamani.

- Sun nazarci samfurorin burbushi 43 da aka dauko, inda suka gano nau'o'in whale masu baki guda biyar da nau'in baleen whale guda daya.
- Sun kayyade shekarun samfurorin kasusuwan burbushi 33 da rabon isotope na strontium, hanyar da ke kwatanta alamar sinadari irin ta ruwan teku da aka adana a burbushi da sanannen tarihin ruwan teku.
- Sun hada abubuwan da suka gani da bayanar tushe na jama'a: an ajiye hotunan asali na wurin da tarin genome na kananan kwayoyin halitta a Science Data Bank, hotunan nau'o'in halittu da aka bincika a gawarwakin kuma suna MorphoBank.

Abin da suka gano

- **Babban tarin da ke zurfi.** Marubutan sun ruwaito wurare 485 na burbushin whale da gawarwakin da ke dauke da halittu a Yankin Diamantina, a zurfin kusan mita 4,600–7,000 kamar yadda karin jadawalin ya nuna.
- **Gawarwaki biyar masu al'ummun halittu.** Wuraren biyar suna matakin amfani da sulfur: kasusuwa sun rufe da shimfidar kananan kwayoyin halitta da tsutsotsi masu huda kashi, inda kuzarin sinadari daga rubewa yake tallafa wa al'umma ta musamman.
- **Al'umma mai yawan halittu.** Dabbobin da ke wurin sun hada da rukunan manyan dabbobi 35 da aka gane, mafi yawansu annelids, crustaceans da molluscs ne. Tsutsotsi masu cin kashi, katantanwar teku, bivalves na Vesicomidae da brittle stars ne suka fi yawa, inda adadinsu ya kai har halittu 2,840 a kowane murabba'in mita a wasu wurare.
- **Tarihin burbushin whale masu baki.** Burbushin 43 da aka dauko sun hada da nau'o'in whale masu baki da ke rayuwa a yankin yanzu, tsaffin nau'o'in da suka shude kamar *Pterocetus* da *Izikozihius*, da wasu ragowar baleen whale. An bayyana samfurin guda a matsayin sabon nau'i, *Pterocetus diamantinae*.
- **Dogon zangon lokaci.** Daga kasusuwan burbushi 33 da aka gwada da isotope na strontium, 25 sun ba da shekaru tsakanin miliyan 0.12 da miliyan 5.26. Mafi tsaffin shekarun suna nuna cewa gawarwakin whale suna faduwa a wannan yankin tun akalla farkon zamanin Pliocene.

Me ya sa whale da yawa suke wurin?

Amsar makalar ba dalili guda mai sauƙi ba ce. Haɗuwar dalilai ne da dama masu yiwuwa.

Wasu gawarwakin watakila sun fito daga baleen whale da suke wucewa a fadadden hanyar hijira. Minke da sei whale suna cin abinci kusa da saman teku, ba a zurfin kilomita 6 ko 7 ba, saboda haka mafi dacewa a fahimci kasusuwansu a wannan zurfi a matsayin gawarwakin da suka nutse bayan mutuwa.

Whale masu baki sun bambanta. Kwararru ne wajen nutsewa zuwa zurfi, suna cin squid da kifi a wuraren da kasan teku yake da gangare mai tsanani. Yankin Diamantina daidai irin

wannan muhalli ne: zurfi na musamman, fasalin kasa mai sarkakiya da siffar V, da dabbobin farauta da aka gani yayin nutsewar. Marubutan suna ganin mutuwa ta yau da kullum, hadarin aikin jiki na neman abinci a zurfi, da yiwuwar gajiya mai kisa ko matsalar sauyin matsin ruwa duk za su iya kara ragowar dabbobi a kasan teku.

Sannan kasan teku yana adana su. Fasalin yankin zai iya karkatar da gawarwakin da suke nutsewa zuwa wuri daya. Karancin taruwar laka yana barin kasusuwa a fili na dogon lokaci. Kafkarfan kashin bakin whale masu baki yana da juriyar lalacewa ta musamman. Oxide na ferromanganese da taruwar carbonate na iya taimakawa wajen adana kasusuwan. Idan aka hada wadannan abubuwa, “makabartar” ba ta zama abin mamaki sosai ba: ba wurin da whale suka zaɓa ba ne, amma wurin da mutuwa take da damar barin tarihi.

Abin da wannan bai tabbatar ba

- **Ba ya nuna** makabartar da whale suka zaɓa da gangan. “Necropolis” kwatanci ne na tarin, ba hujjar hali ba.
- **Ba ya nuna** bala’in mutuwa guda daya. Shekarun sun bazu a miliyoyin shekaru, kuma marubutan sun bayyana tarihin dogon lokaci da aka tara daga maimaitattun abubuwa.
- **Ba ya nufin** an riga an zana taswirar teku mai zurfi sosai. An gano wurin nan ta hanyar aikin jirgin nutsewa mai wuya da tsada a wata hanya guda ta kasa; makalar tana da muhimanci ne domin irin wannan tarihi yawanci ba ya cika.
- **Ba ya mai da** kowane nau’i a al’ummar wurin sabon nau’in da aka gano. Marubutan sun ce yawancin rukunan da aka tattara watakila sababbi ne, amma mafi yawansu an gane su ne zuwa matakin jinsi ko iyali kawai; bivalve guda daya na Vesicomysidae ne kawai aka tabbatar da nau’insa ta kwatanta lambar DNA.
- **Ba ya tabbatar da** cikakken dalilin mutuwar kowane whale. Marubutan sun gabatar da bayanin da ya hada hijira, neman abinci a zurfi, fasalin kasan teku, adanawa da taruwar laka. Wannan ba daidai yake da tabbatar da sanadin mutuwar kowace dabbba ba.

Yaya karfin hujjar yake?

Hujjar kasancewar wurin kanta tana da karfi: lura kai tsaye daga jirgin nutsewa, faruruwan bayanai a taswira, samfurori na zahiri, tantancewar kwayoyin halitta ga wasu dabbobi da kayyade shekarun kasusuwan burbusha da isotope. Da’awoyin da suka fi karfi su ne na lura: wurin yana nan; yana da zurfi; yana da faɗi; akwai al’ummun halittu a gawarwakin whale; kuma wasu burbushin sun kai miliyoyin shekaru.

Da’awoyin da ke bayyana dalilin samuwar wurin dole su fi rauni. Makalar za ta iya nuna inda ragowar suke, menene wasu daga cikinsu, shekarun wasu da abin da ke rayuwa a gawarwakin yanzu. Ba za ta iya maimaita mutuwar ba. An gina bayanin daga ilimin muhalli, aikin jiki, fasalin kasan teku da yanayin adanawa. Wannan shi ne yadda ilimin tsohon muhalli yake aiki:

yana da karfi, amma ya dogara da alamomi masu yawa da suka haɗu, ba kallon abubuwan asali kai tsaye ba.

Dalilin da ya sa yake da muhimmanci

Gawarwakin whale abincin ɗan lokaci ne da zai iya zama muhalli na dogon lokaci. Suna haɗa dabbar saman teku da kasan teku mai zurfi, suna kai carbon, kashi da kuzarin sinadari zuwa muhallin da abinci yake da wuya. Haka kuma suna zama kamar tsibirai ga dabbobi na musamman: tsutsotsi masu huda kashi, bivalves da suke rayuwa tare da kananan kwayoyin halitta masu sarrafa sulfur, brittle stars da katantanwar teku da ke taruwa a kusa da ragowar.

Yankin Diamantina ya kara lokaci a wannan hoton. Yana nuna cewa wasu sassan kasan teku mai zurfi na iya adana tsarin halittu na gawar whale ba kawai a matsayin abubuwa dabam-dabam ba, har ma a matsayin tarihin muhalli da juyin halittar whale. Whale masu baki suna da wuyar bincike saboda suna rayuwa da cin abinci nesa da gani; tarin kasusuwansu a kasan teku zai iya nuna nau'o'i, wuraren yaduwa da tarihin juyin halitta da lura daga saman ruwa kan rasa.

Labari mai tsabta ba wai “masana kimiyya sun gano makabartar whale a teku” ba ne. Ya fi wannan ban mamaki kuma ya fi amfani: wata hanyar kasa mai zurfi ta adana mutuwar whale da yawa har ta juya tsarin halittu na ɗan lokaci zuwa tarihi.

Takaitaccen bayani

Masu binciken Yankin Diamantina a kudu maso gabashin Tekun Indiya sun ruwaito babban tarin gawarwaki da burbushin whale a teku mai zurfi: wurare da gawarwaki 485 a tsawon kusan kilomita 1,200, a zurfin da ya kai kusan mita 7,000, tare da burbushin da shekarunsa suka koma miliyan 5.26. Wurin yana ɗauke da al'ummun halittu na musamman a gawar whale kuma yana adana zuriyar whale na yanzu da waɗanda suka shuɗe, musamman whale masu baki. Sakamakon tarihi ne na musamman na teku mai zurfi, ba makabarta ta zahiri ba, ba bala'in mutuwa guda ɗaya ba, kuma ba hujjar cewa an riga an fahimci teku mai zurfi ba. Muhimmin batu ya fi kunci kuma ya fi karfi: idan yanayin kasan teku ya dace, mutuwar whale za ta iya barin tarihin da zai ɗauki miliyoyin shekaru.

Majiyoyi

Peng et al., A 5.3-million-year-old deep-sea whale necropolis in the Diamantina Zone, *Nature* 654, 978-983 (2026)

<https://doi.org/10.1038/s41586-026-10546-z>

Science Data Bank dataset for the original in situ images and microbial MAGs
<https://doi.org/10.57760/sciencedb.28830>

MorphoBank project P6064 — original images of investigated whale-fall species
<https://morphobank.org/permalink/?P6064>