



UPSC & STATE PCS CURRENT AFFAIRS · UJIYARI.COM

DAILY CURRENT AFFAIRS

JWST Images 'Kua'kua': First Direct Surface Composition of a Rocky Exoplanet

10 May 2026 ·

SCIENCE & TECH

CURATED & WRITTEN BY

**Bharat Choudhary**

UPSC Educator & Content Creator

[linkedin.com/in/epicbharat](https://www.linkedin.com/in/epicbharat)**ALSO FROM THE CREATOR****BharatNotes**Free UPSC notes, MCQs, PYQ analysis. **100% Free.**bharatnotes.com →**ADVERTISE****Advertise with Ujiyari**

Reach thousands of UPSC aspirants daily.

epicbharat@gmail.com

JWST Images 'Kua'kua': First Direct Surface Composition of a Rocky Exoplanet

10 May 2026 · 4 min read · 1 tag

WHY IN NEWS

A study published in *Nature Astronomy* on **May 4, 2026** reports the first **direct surface composition** imaging of a rocky exoplanet using NASA's James Webb Space Telescope (JWST). The target – **LHS 3844 b**, informally named “**Kua'kua**” (“butterfly” in an indigenous Costa Rican language) – is a super-Earth ~49-50 light-years from us.

THE DISCOVERY IN NUMBERS

| PARAMETER | VALUE |
|---------------------|---|
| Planet designation | LHS 3844 b |
| Informal name | Kua'kua (“butterfly”, Costa Rican indigenous) |
| Distance from Earth | ~49-50 light-years |
| Size | ~30% larger than Earth (radius) |
| Mass | ~2 x Earth's mass |
| Type | Rocky super-Earth |
| Host star | LHS 3844 – a small, cool M-dwarf (red dwarf) |
| Orbital period | ~0.5 Earth days (~11 hours) |
| Tidal lock | Yes – one hemisphere always faces star |
| Dayside temperature | ~725 deg C (~1340 deg F) |
| Surface | Dark, basalt-like volcanic rock |
| Atmosphere | None detected |
| Instrument | JWST (MIRI; NIRSpec) |
| Publication | <i>Nature Astronomy</i> , May 4, 2026 |

WHAT MAKES THE STUDY SIGNIFICANT

1. First Direct Surface-Composition Detection

Most exoplanet observations to date have been **indirect**:

- **Transit photometry** – dimming of the host star as the planet crosses
- **Radial velocity** – wobble of the host star
- **Transit spectroscopy** – atmosphere composition from starlight passing through

The JWST observation of Kua’kua provided a **direct thermal-emission spectrum** of the planet’s dayside surface, allowing identification of basaltic (volcanic rock) composition.

2. Confirms a “Bare Rock” World

- No atmospheric absorption features detected
- The dark dayside reflects starlight consistent with **basalt** – the same igneous rock that paves Earth’s ocean floors and the maria of the Moon
- LHS 3844 b is among the **most thoroughly characterised** rocky exoplanets

3. JWST Capability Demonstration

- Confirms JWST’s ability to **directly characterise small, rocky worlds** – not just gas giants
- Validates the **MIRI (Mid-Infrared Instrument)** for thermal emission spectroscopy

ABOUT THE JAMES WEBB SPACE TELESCOPE (JWST)

| PARAMETER | DETAIL |
|---------------------|--|
| Launch | Launched in 2021 (December 25, 2021), on Ariane 5 from Kourou, French Guiana |
| Location | Sun-Earth L2 Lagrange point (~1.5 million km from Earth) |
| Primary mirror | 6.5 m diameter (gold-coated beryllium; 18 segments) |
| Cost | ~USD 10 billion |
| Lead agencies | NASA, with ESA and CSA partners |
| Successor to | Hubble Space Telescope (still operational) |
| Wavelength range | Infrared (0.6 to 28 microns) |
| Primary instruments | NIRCam, NIRSpec, MIRI, FGS/NIRISS |

Why Infrared?

- Cosmic redshift moves light from distant galaxies into infrared
- Infrared penetrates dust clouds (star and planet formation regions)
- Thermal emission from cool objects (exoplanets, brown dwarfs) peaks in infrared

EXOPLANET DISCOVERY – THE BIG PICTURE

Numbers (NASA Exoplanet Archive, mid-2026)

- **5,700+** confirmed exoplanets
- **4,200+** planetary systems
- **~900+** systems with more than one planet
- Confirmed habitable-zone rocky exoplanets: dozens (depends on definition)

Detection Methods (most productive)

| METHOD | SHARE OF DETECTIONS | PIONEERED BY |
|--------------------|---------------------|-------------------|
| Transit | ~75% | Kepler, TESS |
| Radial velocity | ~19% | HARPS, HIRES |
| Microlensing | ~3% | OGLE, MOA |
| Direct imaging | ~2% | Subaru, VLT, JWST |
| Astrometry, Timing | <1% | Gaia, pulsars |

Key Missions

- **Kepler** (2009-2018): launched the exoplanet revolution; ~2,700 confirmed
- **TESS** (2018-): all-sky transit survey
- **CHEOPS** (ESA, 2019): characterisation of known exoplanets
- **PLATO** (ESA, 2026 launch): habitable-zone Earth-sized planets
- **Ariel** (ESA, 2029 expected): exoplanet atmosphere survey

KUA'KUA AND THE HABITABILITY QUESTION

Despite being rocky and Earth-sized, **LHS 3844 b is NOT habitable:**

- Tidally locked -> extreme day-night temperature gradient
- No atmosphere -> no heat redistribution; dayside ~725 deg C
- M-dwarf host stars known for violent flares – stripping atmospheres
- Surface basalt analogous to early Earth or modern Venus crust

The study **does not seek a habitable world** – it advances the **methodology** to characterise rocky exoplanets, an essential capability for future detection of biosignatures on more promising candidates.

INDIA'S EXOPLANET AND SPACE ASTRONOMY PROGRAMME

| PROGRAMME | DETAIL |
|----------------------------|---|
| AstroSat | India's first multi-wavelength space observatory (launched 2015) |
| Aditya-L1 | Solar mission at L1 (launched September 2023; operational at L1 since January 2024) |
| Exoplanet hunt instruments | PARAS spectrograph (PRL Mt Abu); PARAS-2 in commissioning |
| Future | Disha (twin-aeronomy probes); Exosat (X-Ray Polarimetry Satellite, XPoSat, launched January 2024) |

India is also part of international exoplanet collaborations (TESS follow-up, ESA partnerships).

UPSC RELEVANCE

GS Paper 3 – Science and Technology

- Exoplanet detection methods
- JWST and major space telescopes (Hubble, Spitzer, Chandra)
- India's space astronomy: AstroSat, XPoSat, Aditya-L1
- Lagrange points (L1, L2)

Mains Angles

- 1 Discuss the scientific significance of JWST observations for understanding planetary diversity.
- 2 Compare and contrast indirect and direct methods of exoplanet detection.
- 3 Examine India's space astronomy programme and its global positioning.

FACTS CORNER – KNOWLEDGEPEDIA
LHS 3844 B (“KUA’KUA”):

Distance: ~49-50 light-years

Size: ~30% larger than Earth (radius); ~2 x Earth mass

Host star: LHS 3844 (M-dwarf)

Orbital period: ~0.5 Earth days (~11 hours)

Tidally locked; dayside ~725 deg C

Surface: dark, basaltic; no detectable atmosphere

First direct surface composition study of a rocky exoplanet

Instrument: JWST; Publication: *Nature Astronomy*, May 4, 2026

“Kua’kua” = butterfly (Costa Rican indigenous language)

JWST:

Launched in 2021 – December 25, 2021 (Ariane 5, Kourou)

At Sun-Earth L2 Lagrange point

6.5 m primary mirror (gold-coated beryllium, 18 segments)

Wavelength: infrared (0.6 to 28 microns)

Lead: NASA; partners: ESA, CSA

Cost: ~USD 10 billion

EXOPLANET STATS (MID-2026):

5,700+ confirmed exoplanets

4,200+ planetary systems

Transit method = ~75% of detections

LAGRANGE POINTS (SUN-EARTH):

L1 (1.5 mn km Sun-side; Aditya-L1, SOHO)

L2 (1.5 mn km anti-Sun; JWST, Gaia)

L3 (opposite side of Sun)

L4, L5 (60 deg ahead/behind Earth’s orbit)

[← NEWER ARTICLE](#)

Jaishankar's Caribbean Tour: Girmitiya Roots, CARICOM Reach

[OLDER ARTICLE →](#)

DigiPIN: India Post's 4m x 4m Digital Address System

RELATED EDITORIALS

THE HINDU

[The Elephant in India's Data Room: Fragmented Governance, Missed Potential](#)

9 May

INDIAN EXPRESS

[How Can India Produce AI, Instead of Becoming Its Tenant?](#)

6 May

THE HINDU

[At Sea: On India's Naval Indigenisation and the Limits of Project 17A](#)

6 May

BUSINESS STANDARD

[Hear the Alarm — India's SACHET Mobile Disaster Alert System Is a Step in the Right Direction](#)

5 May

RELATED KEY TERMS

KEY TERM

[Active Case Finding \(TB\)](#)

A proactive public health strategy where health workers systematically...

KEY TERM

[Advanced Technology Vessel \(ATV\) Programme](#)

India's classified, decades-long programme to indigenously design and...

KEY TERM

[Agri-Photovoltaic](#)

A dual land-use technology that integrates elevated solar panels with...

KEY TERM

[BharatNet](#)

India's flagship programme to provide broadband internet connectivity...



CURATED & WRITTEN BY

Bharat Choudhary

UPSC Educator & Content Creator

[linkedin.com/in/epicbharat](https://www.linkedin.com/in/epicbharat)[Read Full Article on Ujiyari →](#)<https://ujiyari.com/daily/2026/05/10/jwst-kuakua-exoplanet-surface-imaging/>

ALSO FROM THE CREATOR

BharatNotes

Free UPSC study platform — subject-wise notes across all 4 GS papers, Prelims MCQs, Mains answer frameworks, PYQ analysis & progress tracking. **100% Free • No Login Required.**

[Start Preparing → bharatnotes.com](https://bharatnotes.com)

📌 OPPORTUNITY

Advertise with Ujiyari

Reach **thousands of serious UPSC & State PCS aspirants** daily through our PDFs, website, and social channels.

Ideal for: Coaching institutes • EdTech platforms • Book publishers • Exam prep apps

[✉ epicbharat@gmail.com](mailto:epicbharat@gmail.com)

Write to us for rates & media kit

Free UPSC & State PCS Current Affairs · ujiyari.com · bharatnotes.com