Wallace line

Why in News?

New studies on Wallace line explain how species across the Wallace line were related.

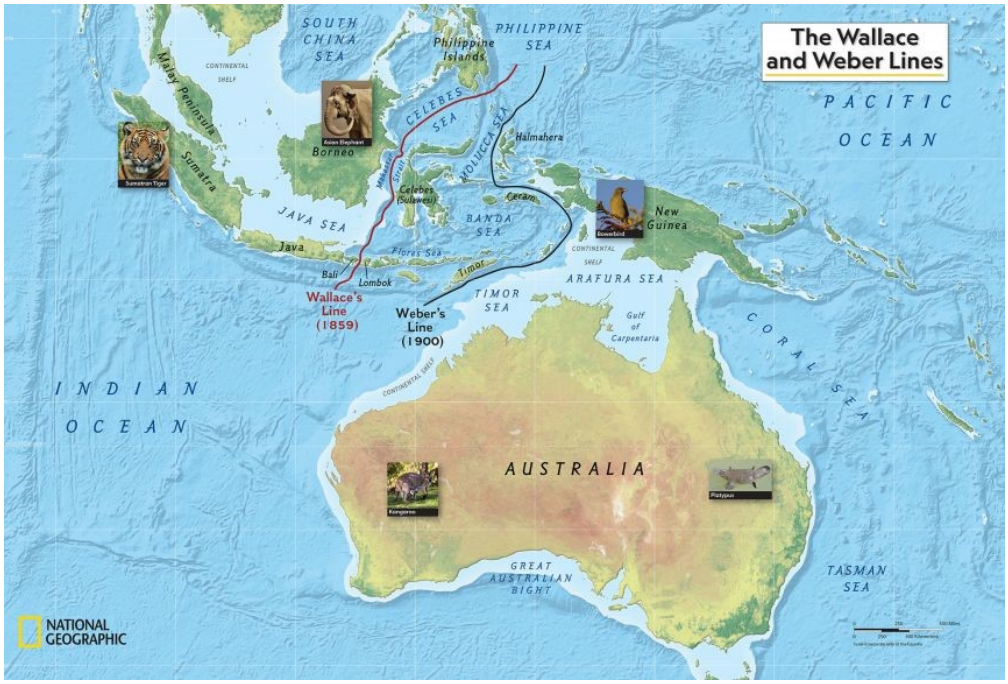
What is Wallace line?

- **Shift in the composition of organisms** - In the 19th century, Alfred Wallace noticed a shift in the composition of organisms as he moved from Asia to Australia, New Guinea, and other islands nearby.

  Alfred Russel Wallace was an English naturalist, explorer, geographer, anthropologist, biologist who independently conceived the theory of evolution through natural selection.

  Kangaroos and cockatoos in Australia and tigers and orangutans with Asia.

- **Wallace line** – It is a imaginary divider used to mark the difference between species found in Australia and Papua New Guinea and Southeast Asia.
- **Location** - The line extends from the Indian Ocean through the Lombok Strait (between the islands of Bali and Lombok), northward through the Makassar Strait (between Borneo and Celebes), and eastward, south of Mindanao, into the Philippine Sea.



- **Species Distribution** - To the west of the line, species are predominantly of Asiatic origin, while to the east, there is a mix of Asian and Australian species.
- **Modern biogeography** – Wallace line laid the foundations for modern biogeography in studying distribution and how they got there.

What is the significance of Sulawesi island?

- **Sulawesi** – It is one of the largest islands in the Indonesian archipelago, situated east of Borneo, west of the Maluku Islands.

- **Biological uniqueness** – Sulawesi island is home to both Asian and Australian species.
  - **Asian species** - It is home to species found nowhere else on the planet, including tarsiers (family Tarsiidae), the lowland anoa (Bubalus depressicornis), and the mountain anoa (Bubalus quarlesi).
  - **Australian marsupials** - Dwarf cuscus (Strigocuscus celebensis).

Tarsier

Lowland anoa

Dwarf cuscus

Mountain anoa

Wallace wrote in 1876 that the animals here showed "affinities" to Africa, India, Java, the Maluku Islands, New Guinea, and the Philippines.

What are the reasons for the species variation along both sides of the line?

- **Complex geology** – The wallace line is part of the Malay archipelago, a geologically complex region with more than 25,000 islands.
- **Asian mainland connect** - Wallace figured that Sulawesi's animal distribution could be explained if some of these islands had been joined with the Asian mainland in the past.
- **Movement of continents** - As the islands broke off and drifted apart, the ancestral species on each island would have become isolated and evolved independently.
- **Origin of Australia** - Millions of years ago, Australia broke off and drifted away from Antarctica.
- An ocean emerged in the growing gap and the water currents in its depths cooled the planet.
- **Australian drift** - Australia drifted north into Asia, creating the volcanic islands of Indonesia.
- **Climate variation** - variations in monsoons, aridity, and sea levels between these islands spurred island species to adapt to their new conditions and diversify, until as recently as four million years ago.
- **Asian species movement** - Species from Asia can migrate through the rainforest-rich

northern route, as the ecosystems are similar to their origins.

Despite global cooling, Malay's tropical islands stayed warmer and wetter than Australia.

- Asian fauna used these islands as stepping stones to Australia.
- **Constriction of Australian fauna** - Australian species, having evolved in cooler climes, struggled to make their way across the islands to Asia.
- Australian species can only move into Asia along the southern route, around Timor and nearby islands.

Reference

The Hindu | Wallace Line