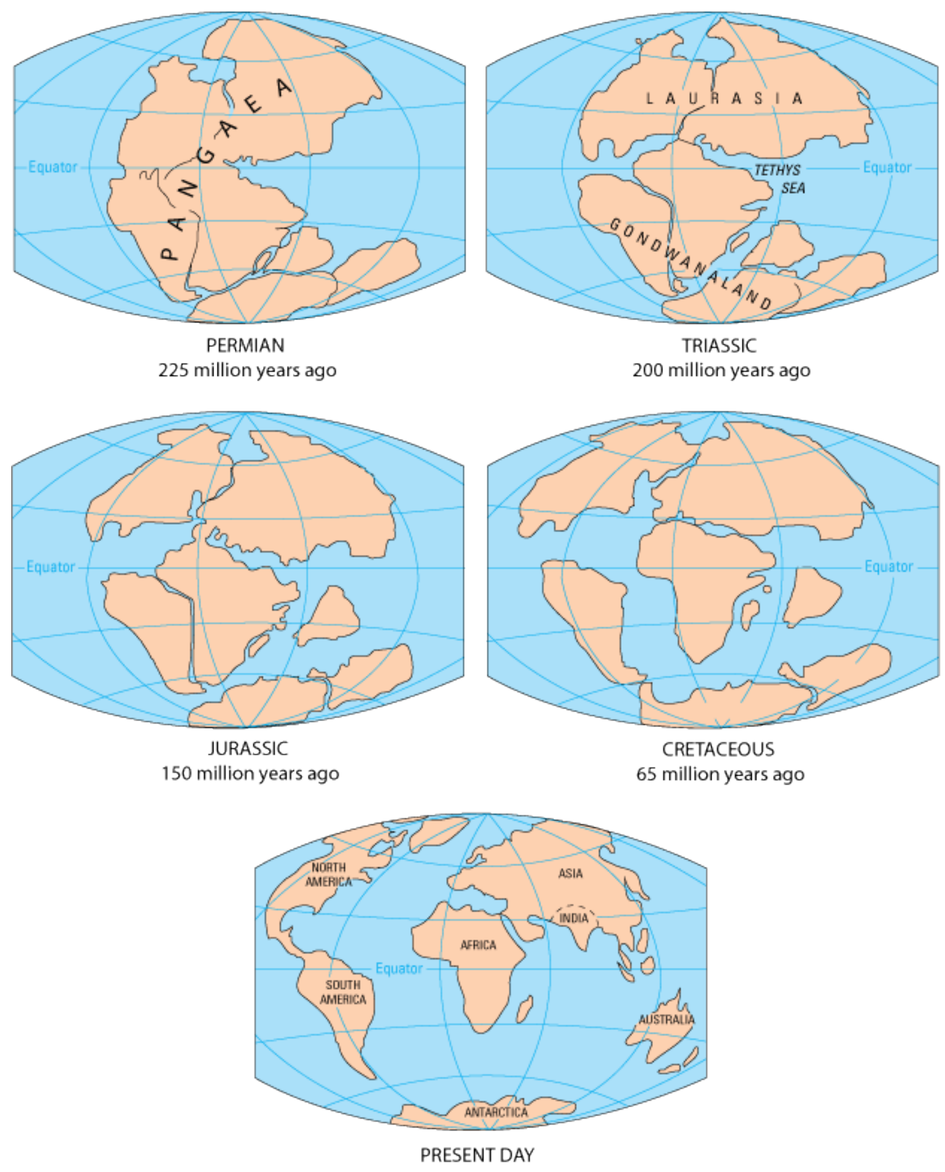
PANGAEA FORMATION — 225 MILLION YEARS AGO

The continents that dispersed when the Rodinia supercontinent broke up between 850 and 750 million years ago slowly came back together to form the next and most recent supercontinent—**Pangaea—**225 million years ago. The mountain-building event that accompanied this collision produced the now-eroding Appalachian Mountains in the eastern U.S. These mountains connect with the Caledonian Mountains in Norway and others in South America, now strewn across the globe since the continents have drifted apart. (See *The First Supercontinent* panel for more information about continental collision and mountain building.)

When Pangaea was a complete supercontinent, the western margin of North America was active—a subduction zone, much like it is today off Washington, Oregon, and Northern California. (See *Pacific Plate Dives Under North America* panel for more information about active margins and how they form.) The eastern margin was sutured to what we know today as Europe and Africa.

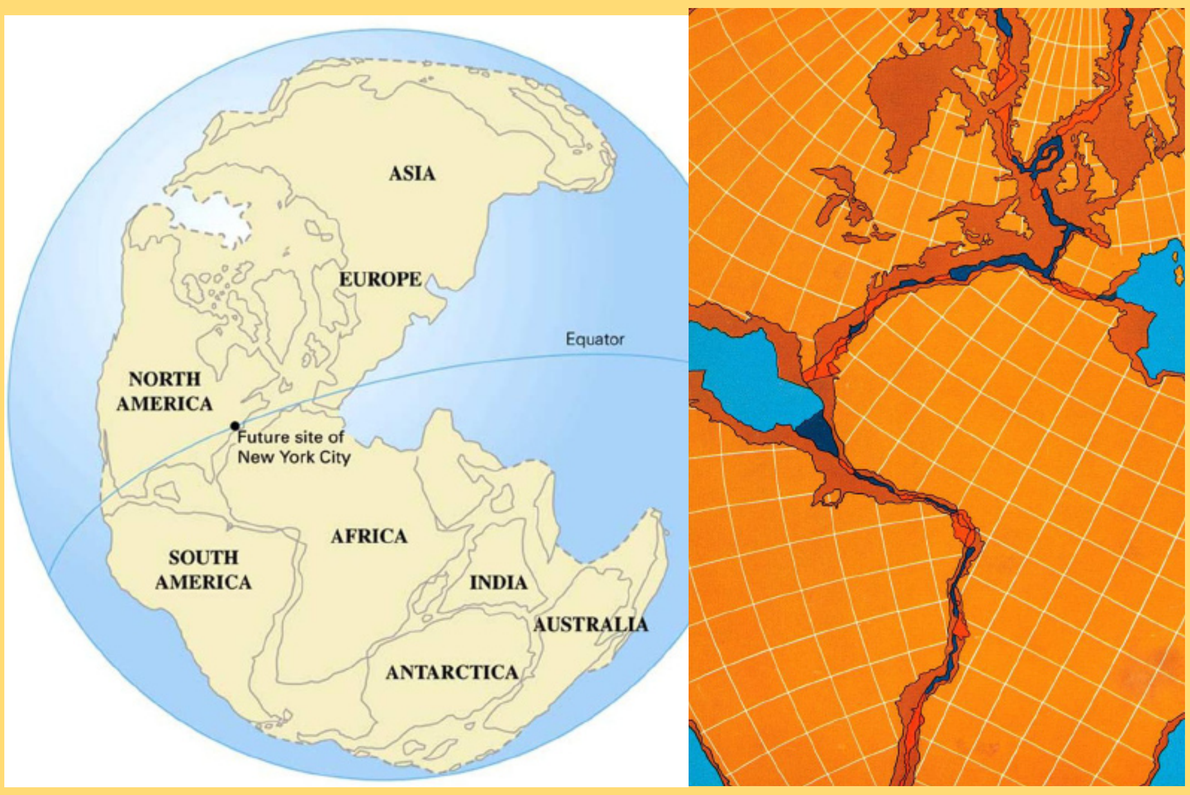
About 205 million years ago, Pangaea began its breakup. North America and South America broke away from Africa, creating the Atlantic Ocean. It was evidence of this great breakup that scientists began noticing early in the 19th century. Alfred Wegener was the most famous geologist to propose the idea that continents were drifting and had at one time been joined in a supercontinent. Most scientists were initially skeptical of his ideas, as they couldn't find an explanation for how the continents moved. Over the years, however, more data was gathered, including paleomagnetic data of the seafloor gathered during World War II. Eventually the theory of **Plate Tectonics** developed, which explained the drift of continents through a combination of seafloor spreading centers (where new ocean forms and pushes continents out of the way), subduction zones (where old ocean sinks back into the mantle), continental collision zones (where continental plates collide and form large mountain chains), and transform boundaries (where plates slide past each other).



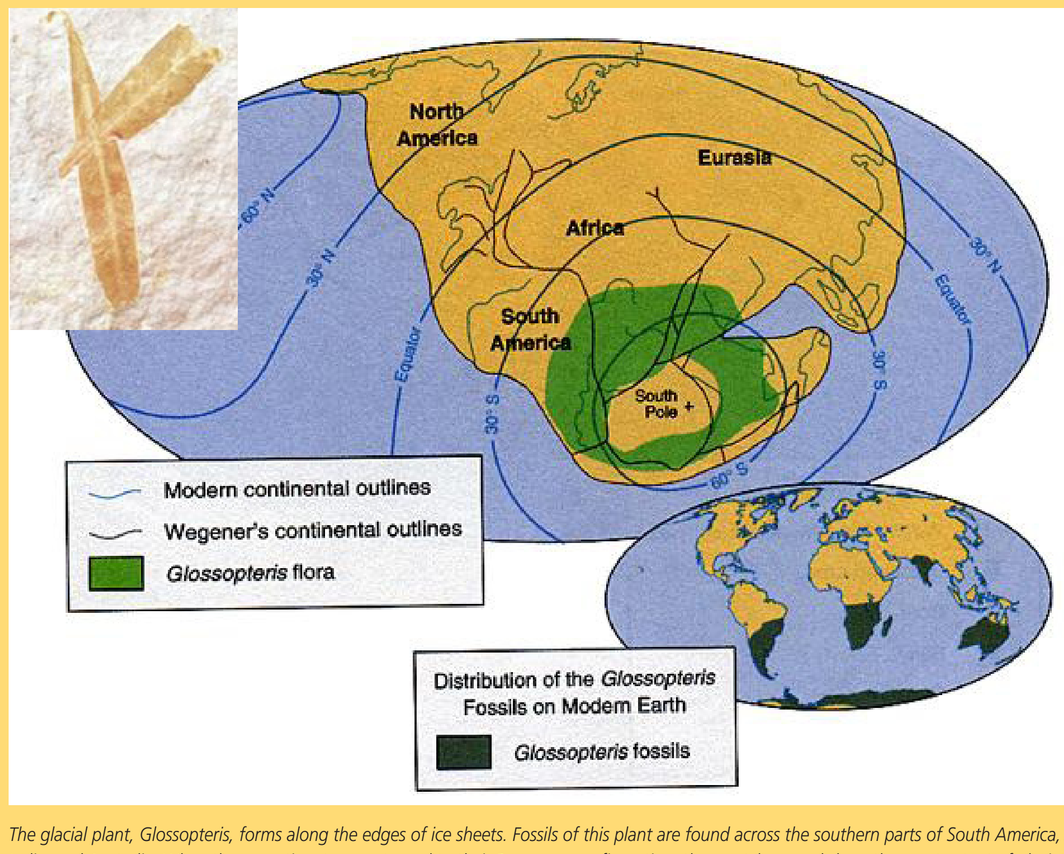
Configuration of the continents when they were fused into the Pangaea supercontinent, 225 million years ago, and their movements after breakup. USGS

Header image shows the Sierra Nevada just north of Saddlebag Lake. These mountains began to form along the western margin of North America at the same time Pangaea formed. The margin was an active subduction zone. The mountains were an active volcanic arc. That volcanic arc has long since ceased activity (we no longer have an active subduction zone). Uplift and erosion in the Sierra Nevada (associated with extension of the area to the east) has exposed the eroded roots of that old volcanic arc. Photo by Katryn Wiese ©

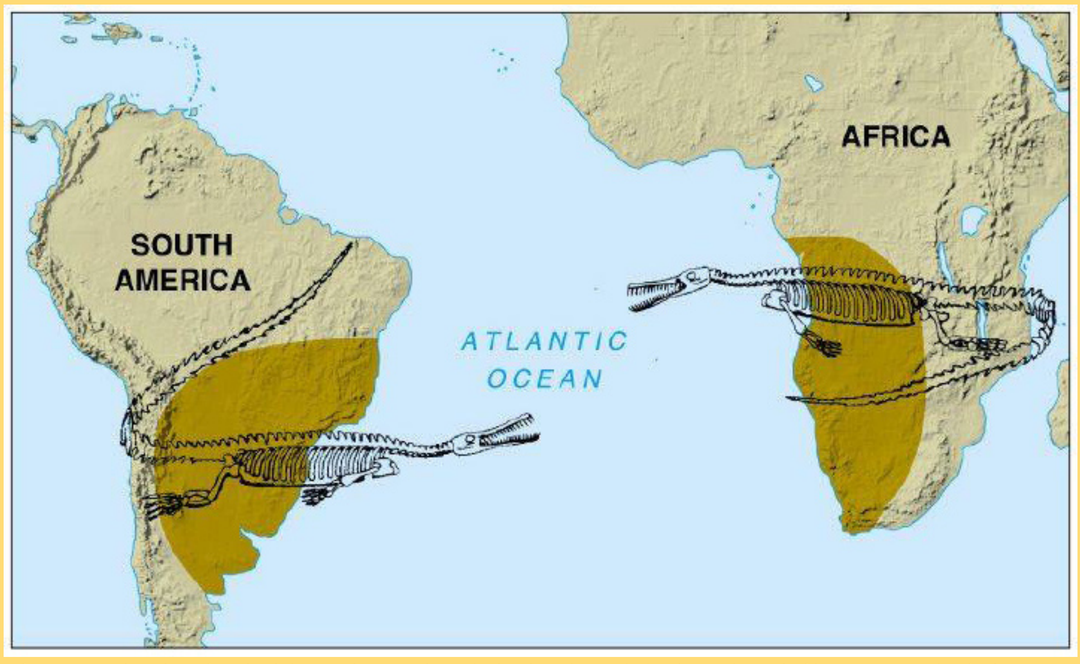
THE IMAGES BELOW SHOW THE EVIDENCE THAT WEGENER AND OTHERS USED TO SEE THAT THE CONTINENTS WERE IN MOTION.



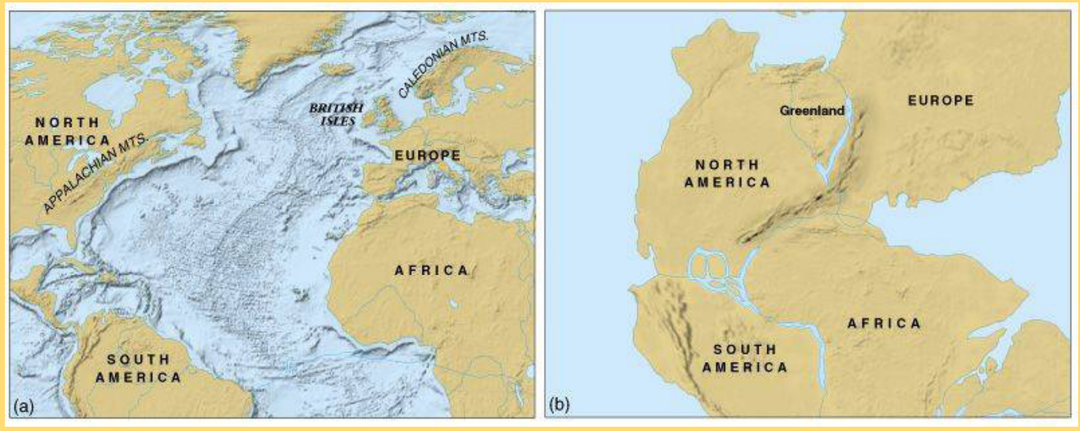
Reconstruction of Pangaea, showing the location of today's continents. Notice the perfect puzzle fit of the margins of South America and Africa (actually the edges of the continental shelves, the true edges of the continents, but currently flooded with 300 feet of sea water). Prentice Hall Publishing ©



The glacial plant, Glossopteris, forms along the edges of ice sheets. Fossils of this plant are found across the southern parts of South America, Africa, India, and Australia. When those continents are returned to their Pangaean configuration, they match up and show the exact extent of glaciation 250 million years ago. Inset shows an example of the fossil. Prentice Hall Publishing ©



Fossils of Mesosaurus have been found only in two places, as shown in the above image, in South America and Africa. Mesosaurus is a freshwater reptile, so the only way to find it on two, now separated continents, is if they were joined, 320 to 280 million years ago when the reptile lived. Mesosaurus became extinct well before Pangaea began breaking apart and producing the Atlantic Ocean. Prentice Hall Publishing ©



250-million-year-old mountain chains in South America, North America, and Northern Europe today and connected in the past during the time when Pangaea formed. These mountains today have the same age, structures, and rock types and are continuous with each other when Pangaea is reconstructed. These would have been Himalayan-type mounains, back when they were forming. Since the breakup of Pangaea, they have been slowly eroding—a process that takes hundreds of millions of yeas. Prentice Hall Publishing ©