
# Ilustraciones de apuntes:

## SÍNTESIS DE LA GEOLOGÍA HISTÓRICA DE LA TIERRA

Hadeano

Arqueano

Proterozoico

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# HADEANO

acreción

Compresión gravitacional y pérdida de volúmen: Inicio de diferenciación interna con producción de calor

Modelo acreción homogéneo en frío

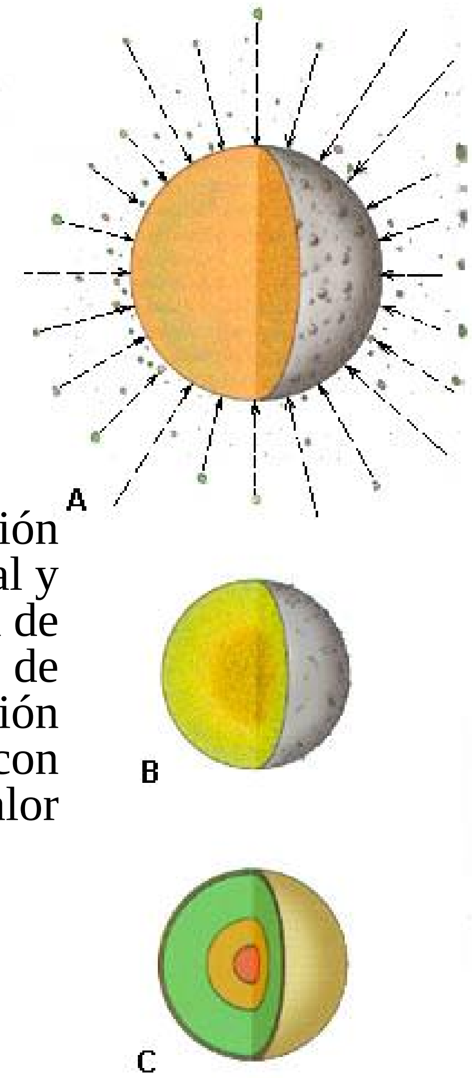



FIGURE 6–7 Conceptual diagrams of stages in the Earth's early history. (A) Representation of the growth of the planet by the aggregation of particles and meteorites that bombarded its surface. At this time, the Earth was composed of a homogeneous mixture of materials. (B) The Earth has lost volume because of gravitational compression. Temperatures in the interior have reached a level at which differentiation has begun. Iron (red drops) sinks toward the interior to form the core, whereas lighter silicates move upward. (C) The result of the differentiation of the planet is evident by the formation of core, mantle, and crust.

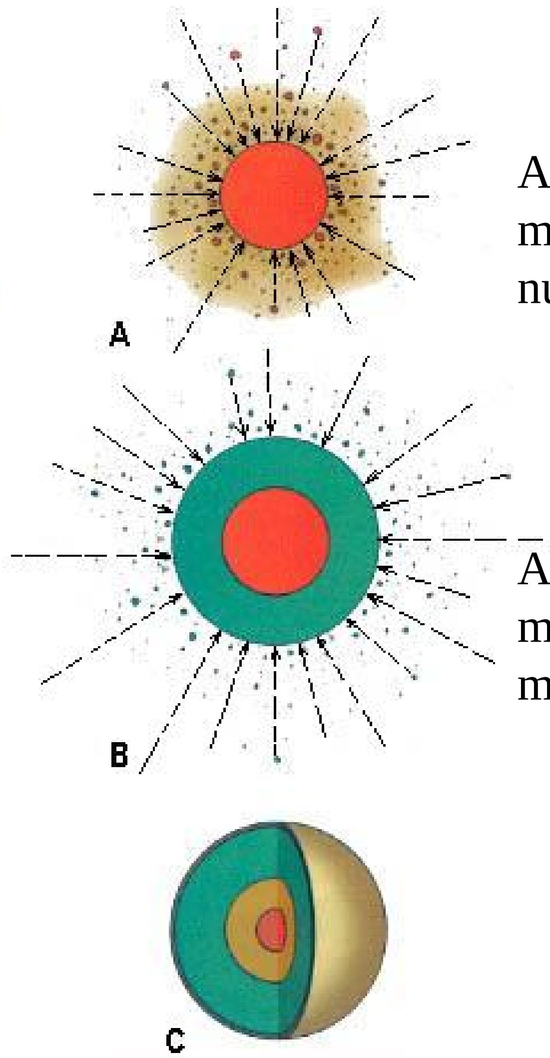


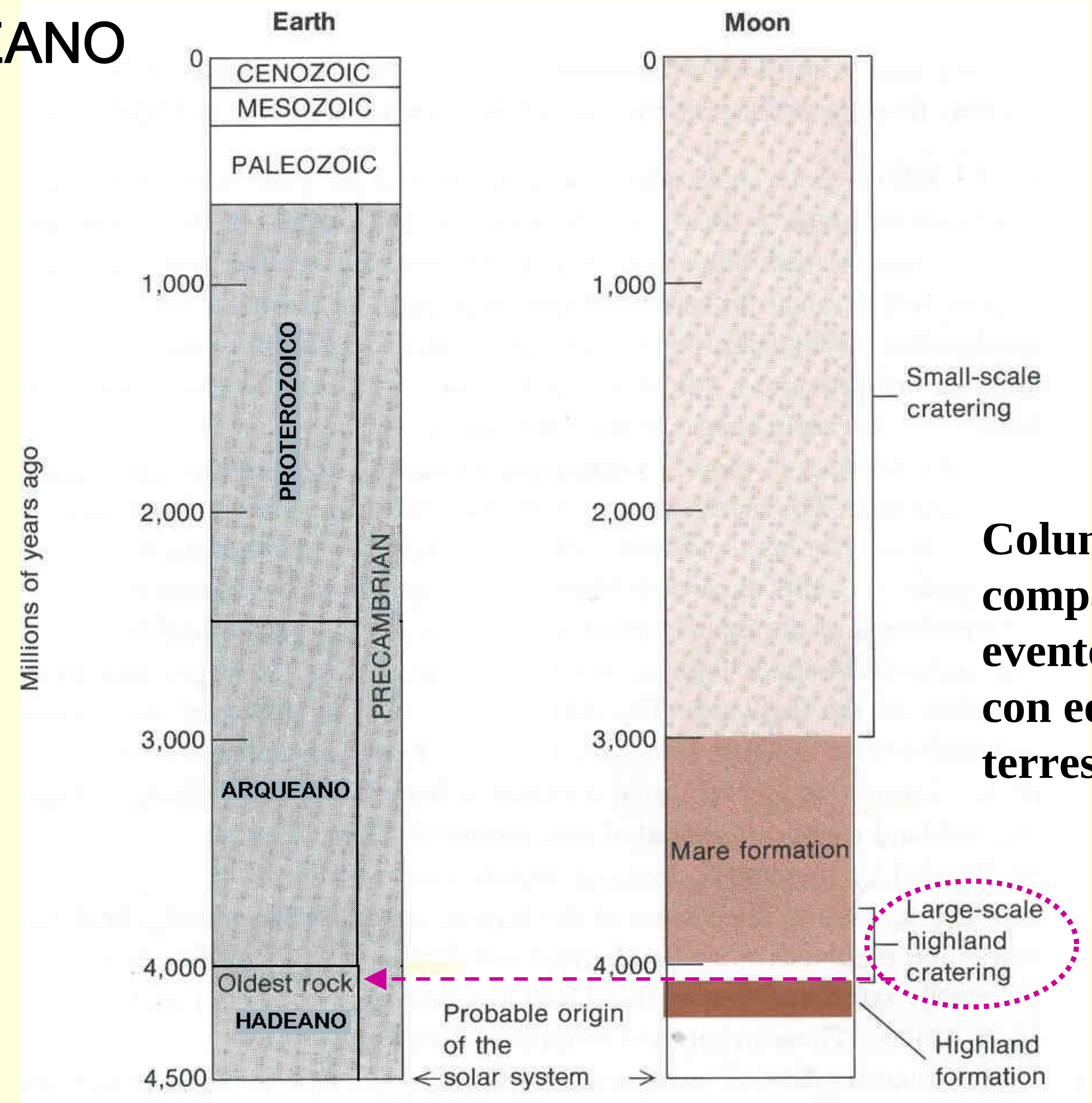

FIGURE 6–8 Origin of the Earth's core according to the hot heterogeneous model of accretion. (A) Primarily iron and nickel condense, collect, and form a core. (B) Silicates envelop the earlier formed core and form a mantle. (C) The mantle differentiates and provides the materials for the crust.

Acreción materiales de núcleo

Acreción materiales de manto

Modelo acreción heterogéneo caliente

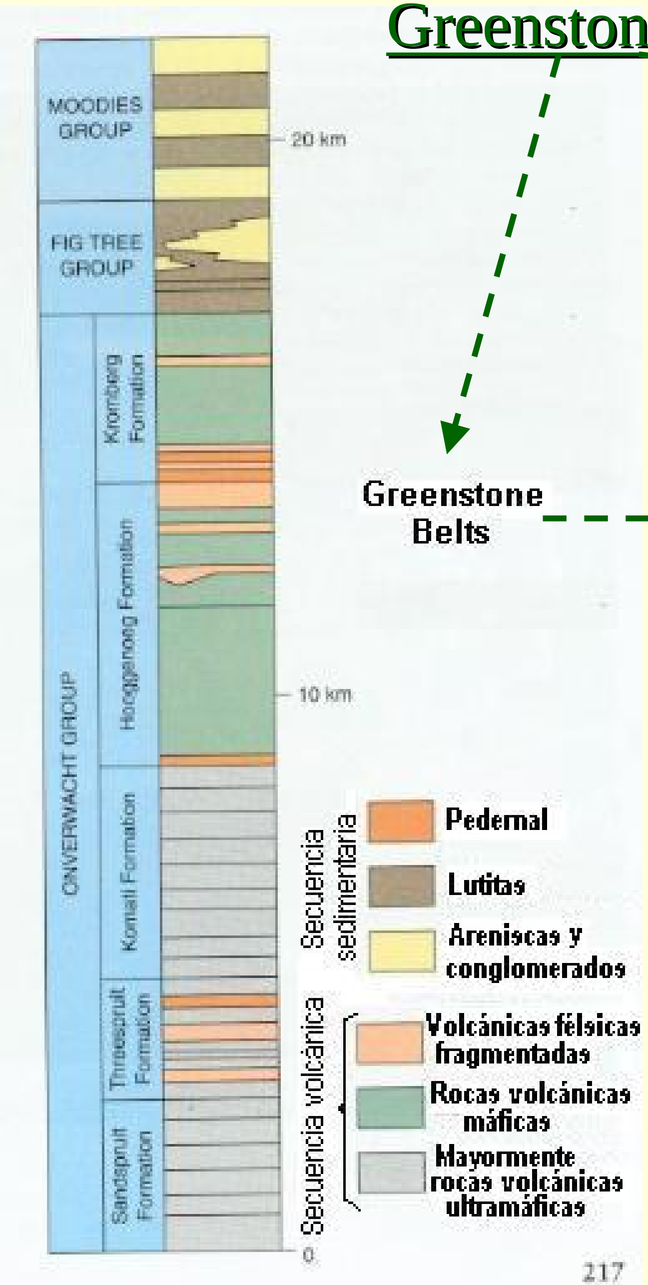
# HADEANO




**Columna comparativa de eventos lunares con eones terrestres**

# ARQUEANO

## Greenstone belts y granitos+granulitas arqueanos




Greenstone Belts


FIGURE 6–22 Generalized cross-section through two greenstone belts. Note their synclinal form and the sequence of rock types from ultrabasic near the bottom to felsic near the top. A late event in the history of the belt is the intrusion of granites. Ultramafic basal layers are particularly characteristic of greenstone belts in Australia and South Africa but do not occur in the Archean of Canada.

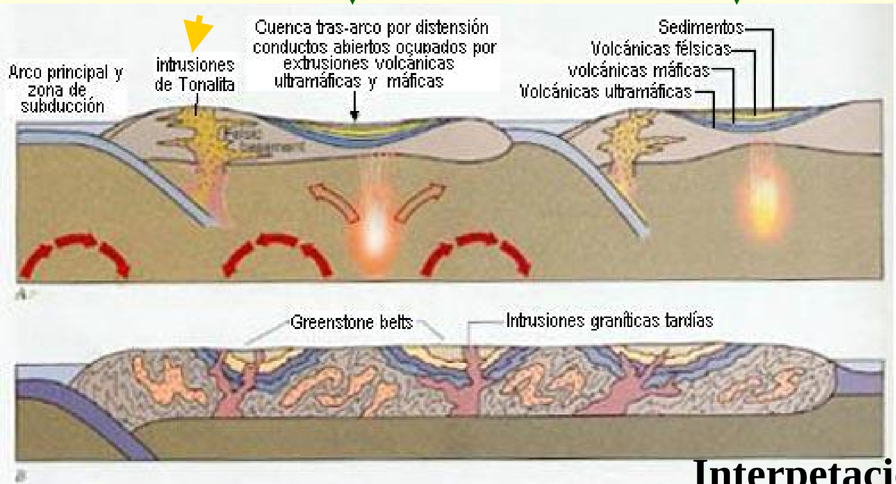



FIGURE 6–24 Plate tectonics model for the development of greenstone belts and growth of continental crust. (A) Plates are in motion, driven by convection cells in the upper mantle. Subduction provides for the emplacement of wedges of oceanic crust and for mixing and melting to provide tonalite intrusions. Behind the main arc, the back arc sags by extension, and the greenstone volcanic sequence is extruded. (B) Compression has occurred to create the greenstone belts with their synclinal form and to aggregate small continental patches into a larger continental mass. Later, granites are intruded in and around greenstone belts. (Simplified from a model proposed by B. F. Windley, 1984. The Evolving Continents, 2nd ed. New York: John Wiley & Sons.)

**Interpetación de origen**

# ARQUEANO

**Aspecto granulitas**

FIGURE 6–19 Archean tonalite gneiss, about 3.8 billion years old, exposed near Lile Narssuaq, Greenland.

**Aspecto de los banded iron formations**

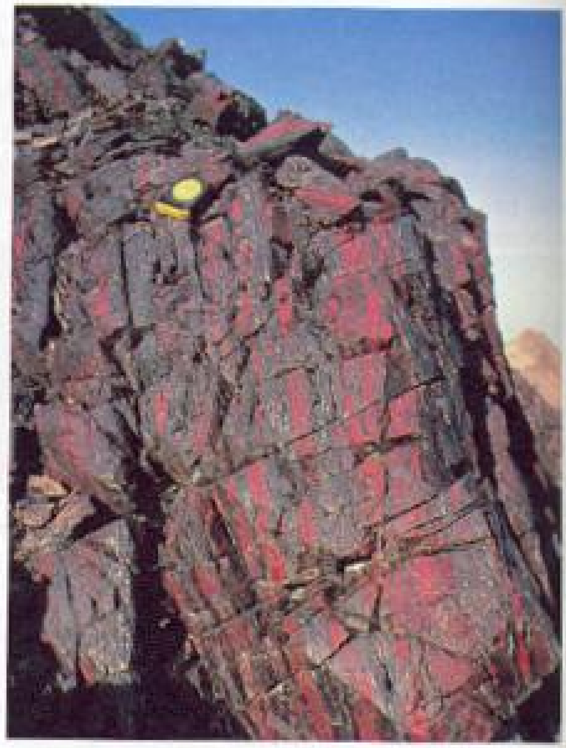


FIGURE 6–11 Banded iron formation. The red bands are hematite and are interbedded with chert. Wadi Kareim, Egypt. (Courtesy of D. Bhattacharyya.)

# ARQUEANO

## Primeros restos de organismos

Probable procaryote remains from the Fig Tree Group of South Africa, magnified from 1,000 to 2,000 times. These fossils, over 3.2 billion years old, are among the oldest preserved remains of life. (*a*) Rod-shaped forms resembling bacteria. (*b*) Spherical forms with a granular surface, possibly a simple blue-green alga.

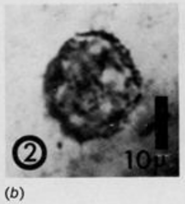
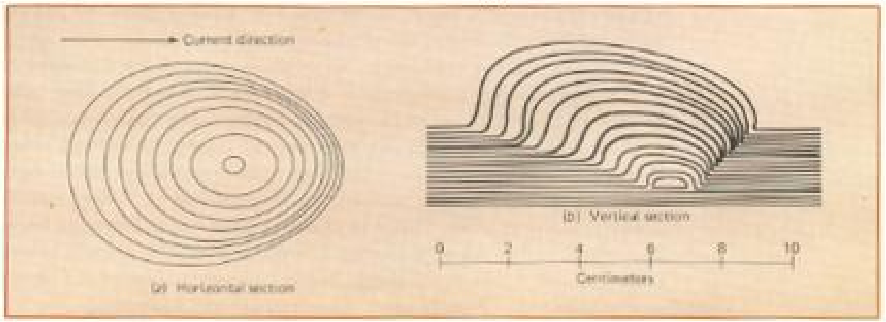
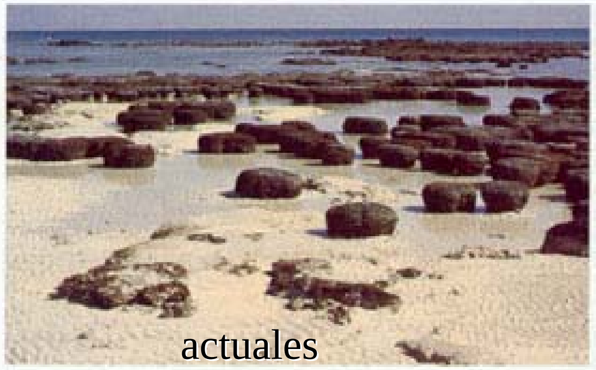



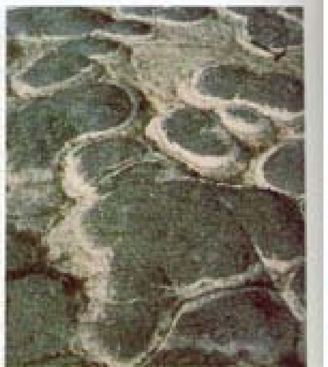

FIGURE 4.8

**Secciones horizontal y vertical de un estromatolito**
**Se ilustra la relación entre forma y dirección de la corriente**




## Estromatolitos



A

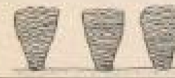
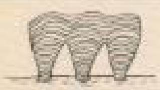
fozilizados en roca caliza

FIGURE 6–31 Present-day and ancient stromatolites. (A) Present-day columnar stromatolites growing in the intertidal zone of Shark Bay, Australia. Metabolic activities of colonial marine cyanobacteria result in the formation of these structures. Fine particles of calcium carbonate settle between the tiny filaments of the matlike colonies and are bound with a mesh of organic matter. Successive additional layers result in the laminations that are the most distinctive characteristic of stromatolites. (B) Fossil stromatolites from Precambrian rocks exposed in southern Africa. (A, courtesy of J. Rosa; B, courtesy of J. W. Schopf, UCLA.)

Corte de roca donde se observa una sección del crecimiento de los estromatolitos

This photo shows 850-million-year-old stromatolites from the Bitter Springs Formation of central Australia. Vertical dimension is 14 cm. (Courtesy of J. W. Schopf.)

Secciones que muestran diversas formas de crecimiento de los estromatolitos

| VERTICAL SECTION OF STROMATOLITES | DESCRIPTION |
|---|---|
|  | Linked hemispheroids with close-linked hemispheroids as a microstructure |
|  | Discrete, vertically stacked hemispheroids |
|  | Linked hemispheroids passing upward into discrete, vertically stacked hemispheroids |
|  | Discrete, vertically stacked hemispheroids passing upward into linked hemispheroids |
|  | Alternation of discrete, vertically stacked hemispheroids and linked hemispheroids |
|  | Concentrically stacked spheroids with laminae composed of close-linked hemispheroids |

# PROTEROZOICO

## Tillitas: diversas imágenes

Acercamientos de afloramientos

observa los fragmentos grandes y angulosos y de diversos tamaños en la matriz fina

Afloramiento en Hunan

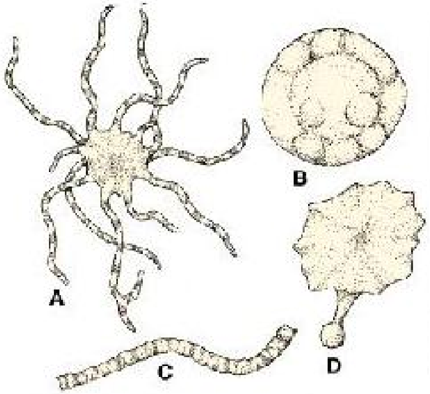
Till: depósito reciente

# PROTEROZOICO

Tillitas con sus estrías glaciares

# PROTEROZOICO temprano y medio

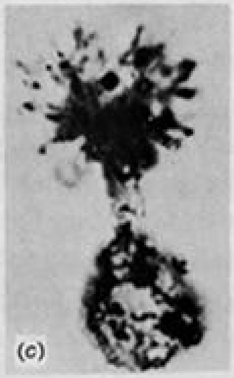
**Probably photosintetic organisms from Gunflint Chert**





A = Eoastrion, probably iron- or magnesium-reducing bacteria
B = Eosphaera, of uncertain affinity, ± 30 micrometers-diameter
C = Animikiea (probably algae)
D = Kakabekia, of uncertain affinity






Procaryote remains from the 1.9-billion-year-old Gunflint Chert of Ontario, Canada magnified from 1,000 to 2,000 times: (a) thread-shaped forms that closely resemble modern filamentous bacteria and blue-green algae; (b) spherical form resembling a modern bacterium; (c) parachute-shaped form of unknown affinities. (*Courtesy of Elso Barghoorn*)

**Organismos procariotas,**
**de Gunflint, Canadá.**
**Proterozoico temprano**

**Acritarcas, *incerta cedis* , de muy amplia distribución. Proterozoico medio**

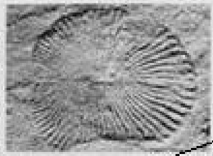
# PROTEROZOICO tardío

## Fauna de Ediacara, Australia: Proterozoico tardío: 630 ma

Restos fosiles

FIGURE 4.10

The oldest known fossil animals from the late Precambrian Ediacara Hills of south Australia. The fossils are preserved as impressions in sandstone. (*a*) Rounded, jellyfish-like forms and a branched sea pen-like form (upper right) (one-third natural size). (*b*) Elongate, worm-like form (magnified two times). (*c*) Rounded, worm-like form (actual size). (*Courtesy of M. F. Glaessner*)


(c)

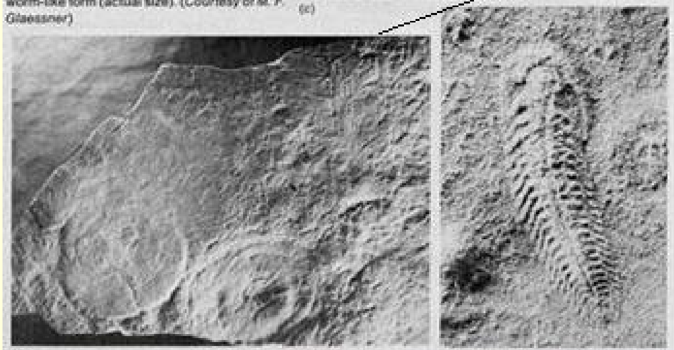

(a) (b)

**FIGURE 7–28** An exceptionally well-preserved specimen of *Dickinsonia costata* in the Ediacaran Rawnsley Quartzite of southern Australia. This fossil has been interpreted as a segmented worm. Divisions on the scale are in centimeters. (*Courtesy of B. N. Runnegar.*)

Reconstrucciones

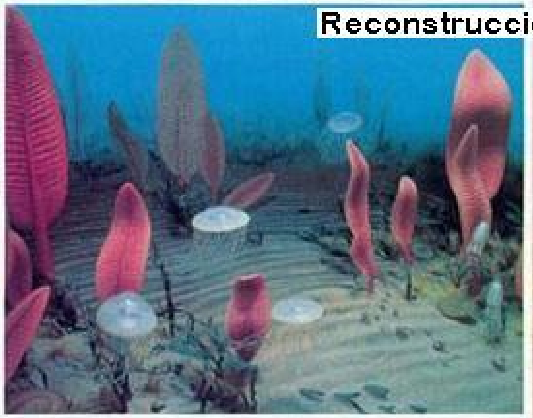
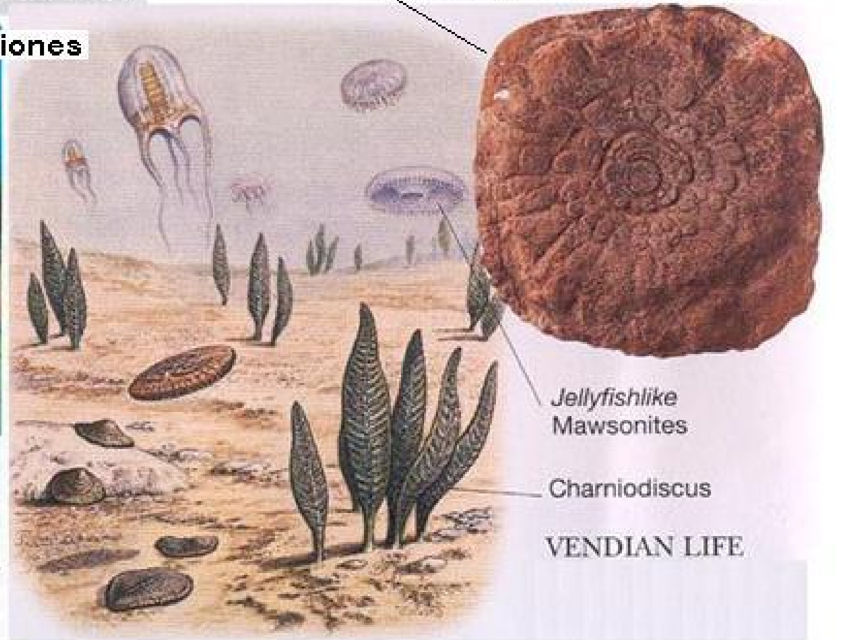


**FIGURE 7–27** Diorama of the sea floor in which lived Ediacaran metazoans. The large, frondlike organisms are interpreted here as soft corals known today as sea pens. Silvery jellyfish are seen swimming about. On the floor of the sea, one can find *Parvancorina* and elongate, wormlike creatures. (*National Museum of Natural History, Smithsonian Institution.*)



# RESUMEN ARQUEANO-PROTEROZOICO

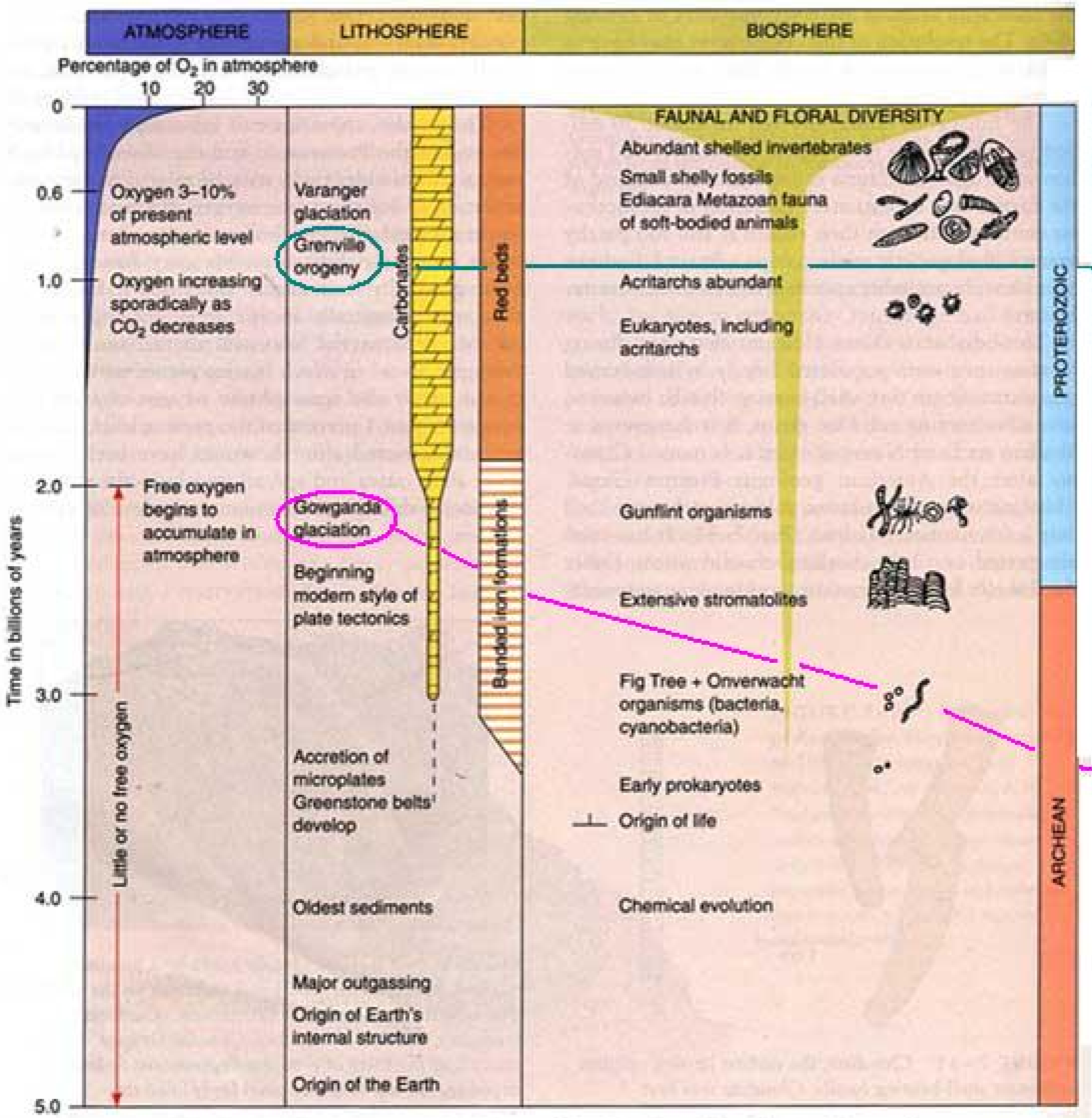
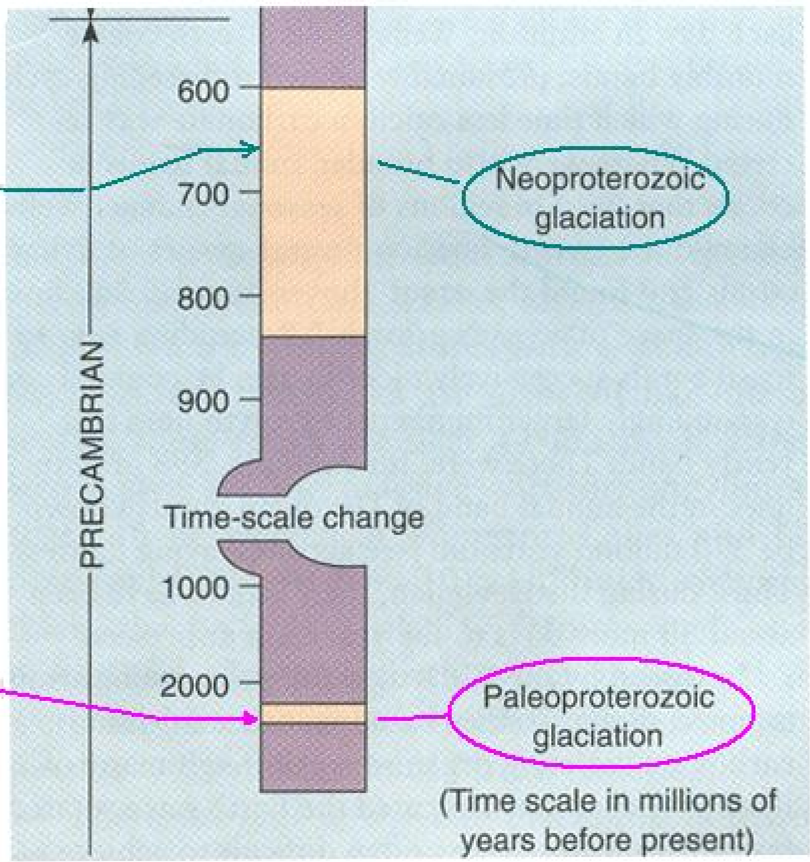
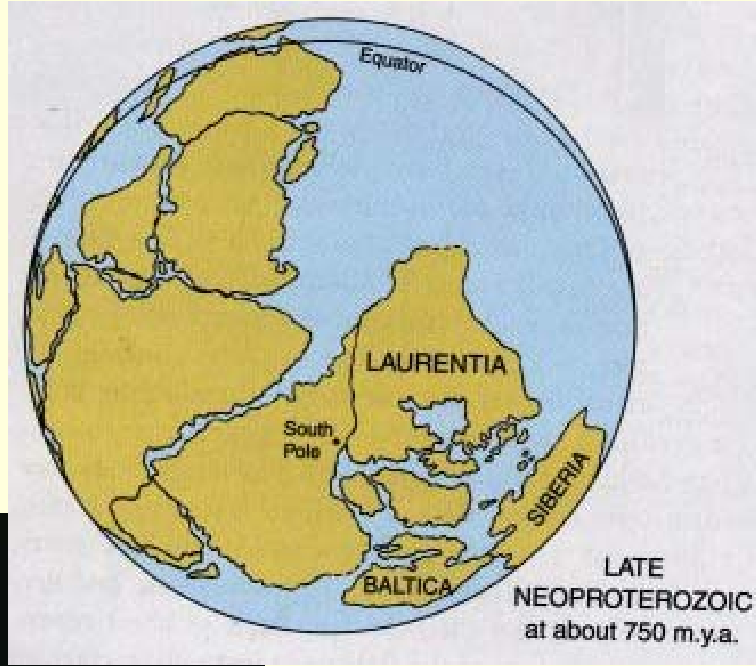


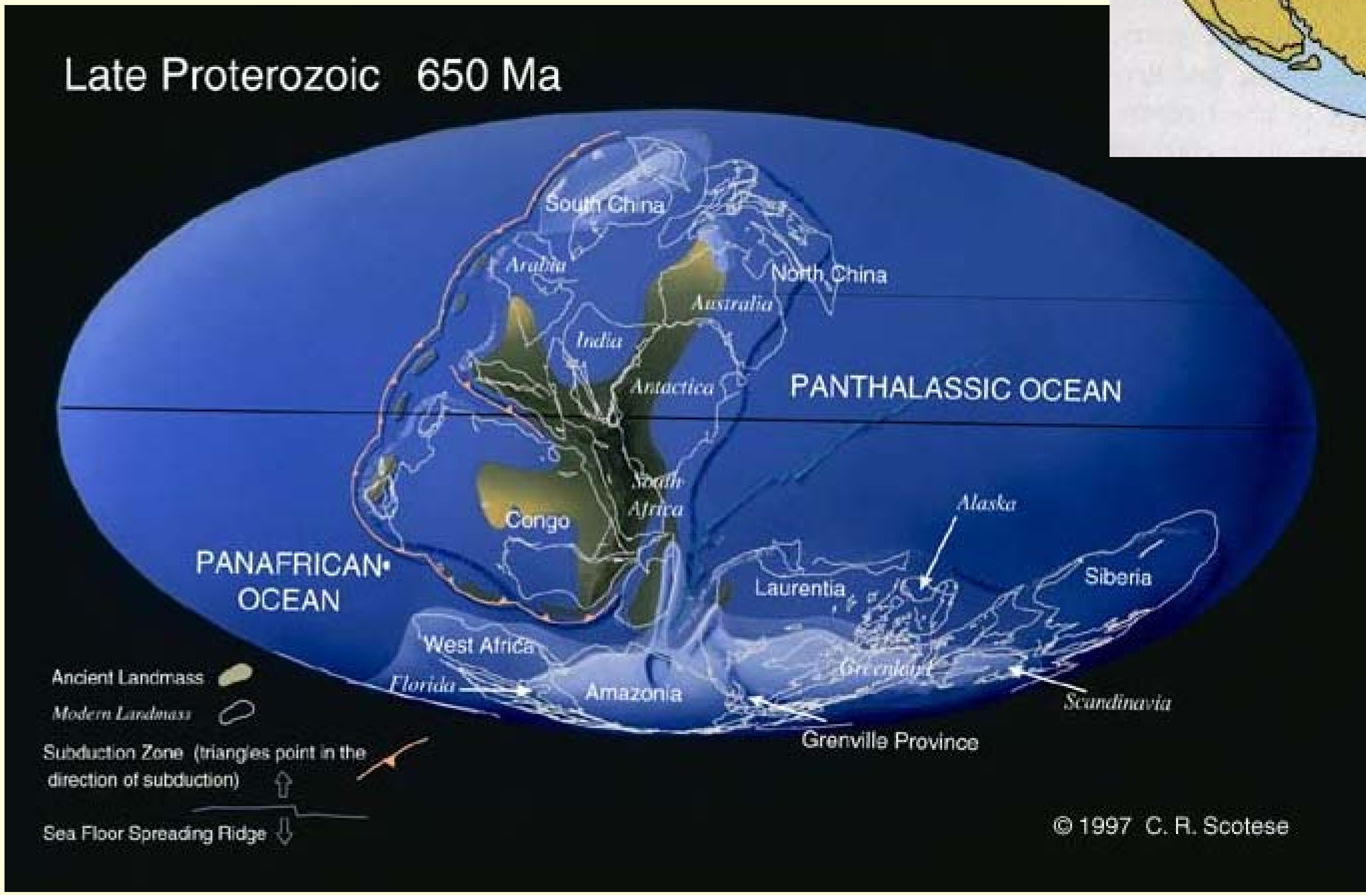

**FIGURE 7–33** Correlation of major events in the history of the biosphere, lithosphere, and atmosphere.

## Glaciaciones del Proterozoico



# PALEOGEOGRAFIA PROTEROZOICO



Fuente principal: Levin, Harold L., 1999. The Earth Trhough Time. 6ª. Edición, Saunders College Publishing, 568p

Otras fuentes:
http://gsc.nrcan.gc.ca/paleochron/05_e.php
www3.interscience.wiley.com
www.swisseduc.ch
http://userpage.fu-berlin.de
www.isgs.uiuc.edu