LAB EXERCISE 12 - STRATIGRAPHIC CORRELATION

Name:	Course ID:

The use of index fossils is advantageous when correlation stratigraphic sections over long distances. Index fossils have a short time span of occurrence and often fall within certain geologic time periods. Figure 7.2 shows a summary of relevant index fossils used in correlation efforts. During this lab exercise you will be using these index fossils (figure 7.2) combined with your knowledge of geochronology to correlate and locate strata over an extended distance. You will also be challenged to decipher the regional geologic history and will learn how strata and geologic time can be traced from one distant location to another.

MATERIALS

— drawing pencils with an eraser — 2 colored pencils (blue & red) — copies of figures 7.2 and 7.3

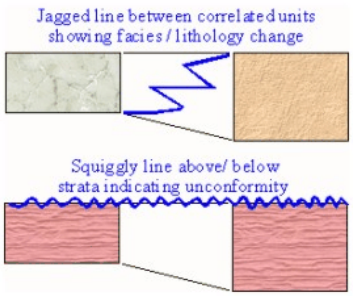
DIRECTIONS

Look at Figure 7.3. It shows three stacks of rock layers, two from outcrops more than 1,500 miles apart and one drill core strata taken from the depth of the earth between the two outcrops. Your job is to determine: a. Which layers (strata) correlate with one another AND which geologic times can be associated and traced throughout these layers.

STEP 1: Use the geochemical data from the analysis of unit u, v, w, x, y, z presented in table 7.2 to calculate the absolute times for each of these units. Transfer your calculated times to figure 7.3.

STEP 2: Identify the fossils depicted in figure 7.3 by comparing them to the Index Fossil Chart shown in figure 7.2. Write down the fossil name AND appropriate relative geologic time and absolute time span next to the fossils depicted in the rock columns (figure 7.3).

STEP 3: Using the geochronological results, the index fossil evidence, the short lithologic descriptors and visual appearance of the strata, connect the layers that appear to be the same using your blue pencil. If there is a facies change or change in lithology over distance, indicate this by a jagged line separating the two strata types in transition as in the example to the right. Also, mark each suspected UNCONFORMITY in your correlation effort with a squiggly line between the strata (see drawing on the right). Use the red pencil to show the changes in time periods across your correlated, stratigraphic sections.



STEP 4: Provide a short geologic narrative explaining how these stratigraphic columns came to be and in which particular time sequence. Deduct the environment of deposition if you can. Start with the oldest and move your way upward to the youngest or most recent event.

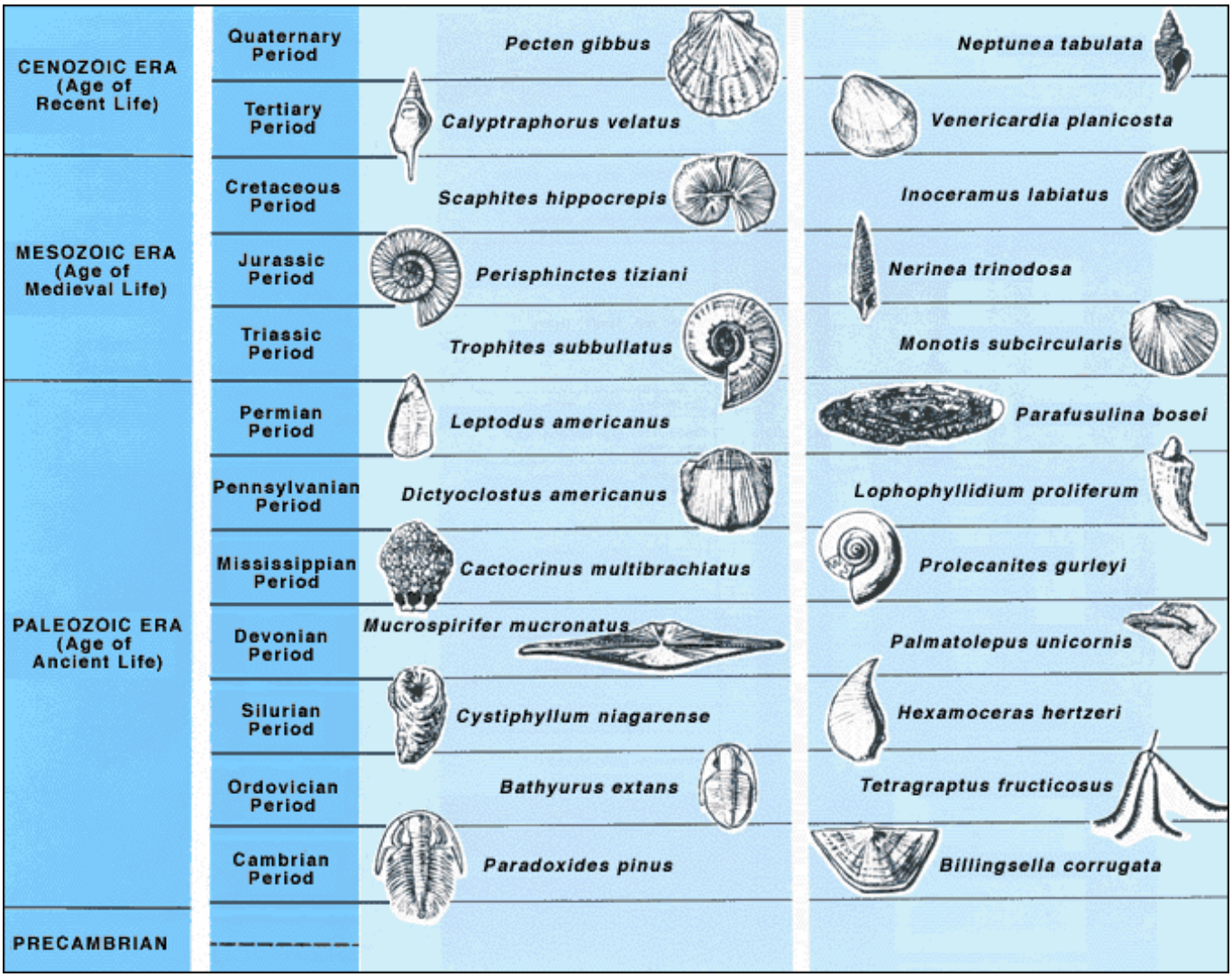


Figure 7.2 - Index Fossils for geologic time periods (Courtesy of United States Geological Survey)

Table 7.2 - Isotopic geochemical results for various igneous samples associated with Exercise 12

Unit	Description	Method	Parent Isotope (mmoles)	Daughter Isotope (mmoles)	Half-Life
U	rounded basalt pebbles	$^{87}Rb \Rightarrow {}^{87}Sr$	13.75	0.10	$48.8 \cdot 10^9$ years
V	rhyolitic ash layer	$^{235}U \Rightarrow {}^{207}Pb$	0.86	0.15	$0.703 \cdot 10^9$ years
W	rhyolitic ash layer	$^{235}U \Rightarrow {}^{207}Pb$	2.24	0.39	$0.703 \cdot 10^9$ years
X	volcanic breccia ash layer	$^{235}U \Rightarrow {}^{207}Pb$	3.99	1.10	$0.703 \cdot 10^9$ years
Y	rhyolite ash with obsidian	$^{40}K \Rightarrow {}^{40}Ar$	44.6	1.6	$1.25 \cdot 10^9$ years
Z	porphyritic rhyolite ash	$^{238}U \Rightarrow {}^{206}Pb$	6.34	0.32	$4.47 \cdot 10^9$ years

Figure 7.3 - STRATIGRAPHIC PROFILE WORKSHEET! *NAME:*_____