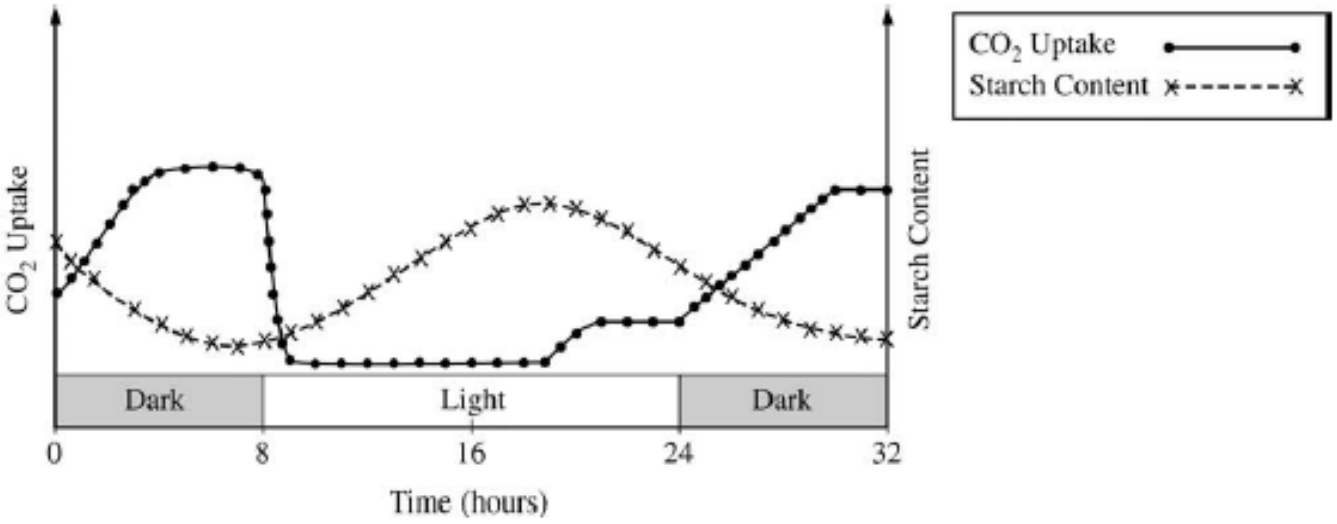
Photosynthesis Questions for exam

A new species of succulent epiphytic flowering plant was discovered in the canopy of a tropical rain forest. Experiments were carried out to determine the plant's photosynthetic capacity by measuring the net uptake of carbon dioxide and changes in tissue starch concentration over a 32-hour period with 8 hours of dark at the start and end of the measurement period and 16 hours of moderate light between the two dark periods. The changes in the rate of carbon dioxide uptake and the concentration of tissue starch are shown in the diagram below.



81. Which of the following is consistent with the data?

(A) The highest rate of carbon dioxide uptake occurs at the beginning of the light period.
(B) The highest rate of carbon dioxide uptake occurs at the beginning of the dark period.
(C) The highest rate of carbon dioxide uptake occurs near the end of the dark period.
(D) The highest starch concentration occurs at the beginning of the light period.
(E) The lowest starch concentration occurs at the end of the light period.

82. The photosynthetic pattern of this plant species is unusual for which of the following reasons?

I. It has a higher rate of carbon dioxide uptake during the light period than during the dark period.
II. It has a higher rate of carbon dioxide uptake during the dark period than during the light period.
III. There is a positive correlation between the rate of carbon dioxide uptake and tissue starch concentration.
IV. There is an inverse correlation between the rate of carbon dioxide uptake and tissue starch concentration.

(A) I only
(B) II only
(C) IV only
(D) I and III
(E) II and IV

83. A useful control for the experiment would have included which of the following?

I. Expose the plant to 32 hours of continuous moderate light and measure rates of carbon dioxide uptake and tissue starch concentration.
II. Expose the plant to 32 hours of continuous dark and measure rates of carbon dioxide uptake and tissue starch concentration.
III. Measure the chlorophyll concentration in the plant's leaf tissue.

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I, II, and III

84. The most likely adaptive significance of this photosynthetic mechanism is to

(A) minimize water loss by taking up carbon dioxide at night
(B) maximize the production of starch at night
(C) maximize the ability to use bright light to take up carbon dioxide
(D) maximize water loss during the day so starch can be made
(E) minimize starch production during the day

1. In a certain prairie community, a dominant prairie grass species has recently been infected with a virus that disrupts one of the electron transport proteins in the chloroplasts of infected cells.

(a) **Describe** the most likely effects on cellular processes (be specific as to which processes and molecules are most likely to be directly affected).

(b) **Describe** and **explain** the most likely effects on individual infected plants.

(c) **Predict** the short-term effects (within a year of infection) on the infected plant populations and their communities. **Justify** your prediction.

(d) **Predict** the long-term effects (years to decades after infection) on the infected plant populations and their communities. **Justify** your prediction.