

Key Scientists in Photosynthesis Research

(reference text: Kimball, Chapter 8)

Instructions:

Use the Kimball textbook, chapter 8, to fill in the blanks on this worksheet. You can work with a partner on in a small group but each student must complete the worksheet. The main pages are listed for each paragraph but it would be helpful if you read through the entire chapter.

Page	
150	Perhaps the first experiment on photosynthesis was reported by _____ in 1648 who incorrectly assumed that the _____ gained during the growth of a _____ tree was due to _____ alone. He did not consider the possibility that _____ in the air might be involved.
151	In 1772, _____ provided the first evidence that _____ were involved in photosynthesis. He knew that if a _____ was placed in a sealed chamber it would go out and that if a _____ was also placed in the chamber it would suffocate since _____ uses up the oxygen. He then discovered that if a plant is placed in an atmosphere without _____ the plant can quickly replenish the gas and a mouse can _____ in the resulting mixture. He thought it was simply the _____ of the plant that accounted for the production of the _____ gas.
151	In 1778, the Dutch physician _____ - _____ discovered that the production of oxygen only occurs when the plant is _____. He also demonstrated that only the _____ parts of plants released _____ during photosynthesis.
151	The growth of plants is accompanied by an increase in their _____ content. _____ discovered that the source of this _____ is from _____. He WRONGLY assumed that the CO ₂ is _____, with the _____ becoming incorporated into the _____ matter of the plant and the _____ being released (actually, the O ₂ comes from the process of _____ of water).
153	In 1881, the German plant physiologist, T.W. _____, performed a series of experiments to discover which _____ of light were most effective in promoting photosynthesis. He placed a filamentous green _____ under the microscope and illuminated it with a tiny _____. In the medium surrounding the strand were aerobic _____. The portions of the filament illuminated by _____ and _____ light were found to have the greatest density of _____ around them. This makes sense if these portions were releasing the most _____, a by-product of photosynthesis. Thus, he concluded that the _____ rays and the _____ rays are the most effective colours for photosynthesis. A plot of this data is called the _____ spectrum.
157	That photosynthesis does involved two distinct processes (light-dep. and light-indep.) stemmed from experiments by _____, a British plant physiologist. He used the water plant _____ as a test organism; when a sprig is placed in NaHCO ₃ (which provides a source of _____) and illuminated, the sprig releases _____ bubbles which can be counted and used as a measure of the rate of photosynthesis at various light intensities. He determined that the rate of photosynthesis _____ (does/does not) continue to increase indefinitely with increased _____. Thus, at "moderate" light intensities, the _____ reactions pace the entire process. At higher light intensities, the _____ reactions reach a point where they are working at maximum capacity and any further illumination is ineffective and the process reaches a _____ state. Overall, 3 factors play major roles in determining the rate of photosynthesis: (1) _____ concentration, (2) _____, (3) _____ intensity.

159-160	<p>The stages of the dark reactions (light-indep.) were worked out by Dr. _____ by exposing suspensions of unicellular green _____ to _____ and to radioactive _____ (with C-14 in it). After various intervals of illumination, the _____ suspension is inactivated and the components of the cells separated by a process called paper _____. In this process each component migrates along the paper at a unique rate in a given _____. Using this technique, Dr. _____ discovered radioactivity (from the radioactive C-14) in _____ within about 30 seconds. Figure 8.17 shows that after _____ seconds a high amount of radioactivity (dark spot) is found in the compound phosphoglycerate or _____. In this way he was able to map out all the stages of the light-independent reactions.</p>
161	<p>Van Neil, an American microbiologist, studied the role that _____ plays in photosynthesis by studying _____ bacteria which can produce _____ from CO₂. Overall, Van Neil discovered that these bacteria do not produce _____ (instead the release S) since water is not used as a starting material.</p>
162	<p>In 1941, a heavy isotope of oxygen, _____, was available to Samuel Rubin who labelled _____ with it. His experiments finally proved that oxygen evolved in photosynthesis comes from _____.</p>
166	<p>The term "photophosphorylation" was coined in 1954 by _____ who demonstrated that when isolated chloroplasts are supplied with ADP and inorganic _____ and then _____ they proceed to produce _____. He also did research on cyclic _____ which produces ATP but no _____ or oxygen.</p>

