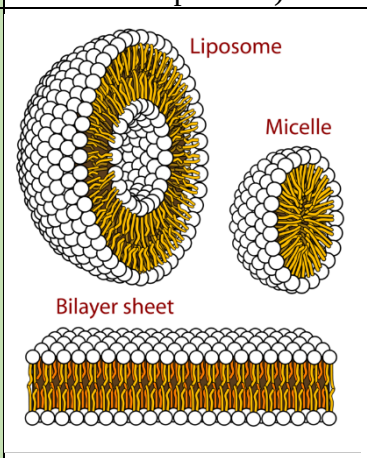
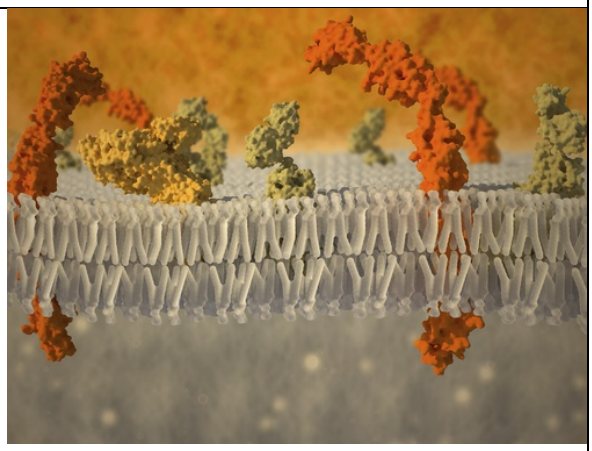
生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	膜在水基環境中製造與管理脂肪和油 (Membranes make and manage fats and oils in a water-based environment)
生物系統 LIVING SYSTEM	生物 (Organisms)
功能類別 FUNCTIONS	#改變溶解度（溶解、乳化、沉澱、結晶） #Modify solubility (dissolving, emulsifying, precipitating, crystallizing)
作用機制標題	活細胞中的脂質膜透過形成親脂溶性化合物的微觀空間來促進水性環境中的非極性化學反應 (Lipid membranes in living cells facilitate non-polar chemistry in an aqueous environment by forming microscopic spaces friendly to fat-soluble compounds.)
生物系統/作用機制示意圖	 

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

與現代工業不同，生物系統能夠在水基 (water-based) 環境中與水溶性（極性，polar）和脂溶性（非極性，non-polar）化合物進行複雜的化學反應。然而，大多數工業程序通常仰賴有毒的化學溶劑來與非極性物質進行複雜的反應。許多生物已經演化出在水中操控非極性分子的能力，因為它們別無選擇——地球是一個水基環境。它們透過發展所謂的「微環境」 (micro environment) 來實現此一壯舉，這種環境為非極性物質提供了一個有利的分子大小的、水溶性的包膜 (envelop)，內含球狀蛋白 (globular protein)、脂質雙分子層 (或稱磷脂雙層膜，lipid bilayer) 和微胞 (micelle)。

Unlike modern industry, biological systems are capable of performing complex chemistry with both water-soluble (polar) and oily (non-polar) compounds in a water-based environment. Most industrial operations, however, rely on often toxic chemical solvents to perform complex reactions with non-polar substances. Organisms have evolved the ability to manipulate non-polar molecules in water because they have no other choice--Earth is a water-based environment. They've achieved this feat by developing what could be referred to as “micro

environments” that provide non-polar substances a favorable molecular-sized, water-soluble envelop including globular proteins, lipid bilayers, and micelles.

文獻引用 (REFERENCES)

「含有強極性和強非極性基 (group) 的化合物被稱為兩親分子（amphiphilic 來自希臘語，amphi 意指『兩者』，philos 意指『喜愛』）。脂肪酸鹽是具有生物相關性的典型例子。它們具有一個長的非極性烴尾和一個強極性的羧基頭部，例如棕櫚酸 (palmitic acid) 鈉鹽。這些物質在水溶液中的行為反映了它們極性和非極性對比特質的組合。離子羧酸鹽官能團很容易水合，而疏水性的長尾則本質上是不易溶解的。儘管如此，棕櫚酸鈉和其他兩親分子很容易分散在水中，因為這些物質的烴尾以疏水相互作用而連接在一起，如同它們的極性羧酸鹽官能團以典型的親水方式進行水合。這些兩親分子的團簇被稱為微胞 (micelle)。」(Garrett and Grisham, 2010: 33)

“Compounds containing both strongly polar and strongly nonpolar groups are called amphiphilic molecules (from the Greek amphi meaning “both” and philos meaning “loving”). Salts of fatty acids are a typical example that has biological relevance. They have a long nonpolar hydrocarbon tail and a strongly polar carboxyl head group, as in the sodium salt of palmitic acid. Their behavior in aqueous solution reflects the combination of the contrasting polar and nonpolar nature of these substances. The ionic carboxylate function hydrates readily, whereas the long hydrophobic tail is intrinsically insoluble. Nevertheless, sodium palmitate and other amphiphilic molecules readily disperse in water because the hydrocarbon tails of these substances are joined together in hydrophobic interactions as their polar carboxylate functions are hydrated in typical hydrophilic fashion. Such clusters of amphipathic molecules are termed micelle.” (Garrett and Grisham 2010: 33)

參考文獻清單與連結 (REFERENCE LIST)

Garrett, R. H. and C. M. Grisham. (2012). *Biochemistry*. Cengage Learning.

延伸閱讀

生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

撰寫/翻譯/編修者與日期

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