

# Ηλεκτρομαγνητισμός

## Διάλεξη 05

A. Δροσόπουλος

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## 1 Παραδείγματα

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## BIO APPLICATION Electric Forces,

**Sweat, and Cystic Fibrosis** One way to test for the genetic disease cystic fibrosis (CF) is to measure the salt content of a person's sweat. Sweat is a mixture of water and ions, including the sodium ( $\text{Na}^+$ ) and chloride ( $\text{Cl}^-$ ) ions that make up ordinary salt ( $\text{NaCl}$ ). When sweat is secreted by epithelial cells, some of the  $\text{Cl}^-$  ions flow from the sweat back into these cells (a process called reabsorption). The electric attraction between negative and positive charges pulls  $\text{Na}^+$  ions along with the  $\text{Cl}^-$ . Water molecules cannot flow back into the epithelial cells, so sweat on the skin has a low salt content. However, in persons with CF the reabsorption of  $\text{Cl}^-$  ions is blocked. Hence the sweat of persons with CF is unusually salty, with up to four times the normal concentration of  $\text{Cl}^-$  and  $\text{Na}^+$ .



**BIO APPLICATION** **Sharks and the "Sixth Sense"** Sharks have the ability to locate prey (such as flounder and other bottom-dwelling fish) that are completely hidden beneath the sand at the bottom of the ocean. They do this by sensing the weak electric fields produced by muscle contractions in their prey. Sharks derive their sensitivity to electric fields (a "sixth sense") from jelly-filled canals in their bodies. These canals end in pores on the shark's skin (shown in this photograph). An electric field as weak as  $5 \times 10^{-7}$  N/C causes charge flow within the canals and triggers a signal in the shark's nervous system. Because the shark has canals with different orientations, it can measure different components of the electric-field vector and hence determine the direction of the field.



Παραδείγματα από βιβλίο σελ 771-775

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