

- 3 At the 2000 Summer Olympics in Sydney, 83 percent of the medal-winning
4 swimmers wore the Speedo Fastskin swimsuit.
5 This revolutionary swimsuit allows wearers to glide through the water with much
6 less resistance, thanks to a material designed to mimic the skin of one nature's
7 fastest swimmers, the shark.
8 The Fastskin is an example of “biomimetrics,” the field of research in which
9 product designs are based on phenomena found in nature.

10 Further Questions & Sample Answers

- 11 1) What did 83 percent of the medal-winning swimmers wear during the 2000
12 Summer Olympics?

13 *They wore Speedo Fastskin swimsuits.*



- 14 2) What's “biomimetrics”?

15 *Biomimetrics is the field of research in which product designs are based on*
16 *phenomena found in nature.*

- 17 This is not a new idea—Leonardo da Vinci designed aircraft in the same
18 way—but biomimetrics has taken off only in the last 10 to 15 years as more
19 scientists from a variety of disciplines turn to nature for inspiration.
20 In Japan, for example, researchers are carrying out trials of a nearly painless
21 hypodermic needle with a design based on the mosquito's proboscis (the thin tube
22 that forms part of its mouth).
23 Researchers in the United States are studying the humpback whale's flippers in
24 the hope of developing wind turbines that can turn even at low wind speeds.

25 Further Questions

- 26 3) What're biomimetric researchers in Japan doing?

27 *Researchers are carrying out trials of a nearly painless hypodermic needle with a*
28 *design based on the mosquito's proboscis.*

- 29 4) Why have researchers in the United States been studying the humpback
30 whale?

31 *They hope to develop wind turbines that can turn even at low wind speeds.*

- 32 Given that natural organisms have evolved over millions of years, researchers in
33 the field of biomimetrics can be confident that they are imitating extremely
34 efficient systems.

35 Nevertheless, they face great difficulty in copying all aspects of nature's complex
36 designs.

37 The makers of the Stickybot, a robot designed to copy the gecko lizard's ability to
38 climb smooth glass surfaces, envisioned it being used in search-and-rescue
39 operations.

40 Unfortunately, the technological limitations mean the robot can only climb at the
41 expense of speed—unlike the gecko, which can climb incredibly quickly.

42 Mark Cutkosky, one of the Stickybot's developers, admits that in order to build
43 the robot at all, "there are a lot of things about the gecko that we simply had to
44 ignore."

45 Further Questions & Sample Answers

46 5) Why are researchers in the field of biomimetics confident about imitating
47 animals?

48 *Given that natural organisms have evolved over millions of years, researchers in*
49 *the field of biomimetics can be confident that they're imitating extremely*
50 *efficient systems.*

51 6) Why couldn't the Stickybot be used in search and rescue operations?

52 *The technological limitations mean that the robot can only climb at the expense*
53 *of speed—unlike the gecko.*

54 So far, the number of commercially successful biomimetics products has been
55 limited.

56 As technology continues to advance, however, biomimetics research may find it
57 easier to catch up with nature.

58 Nevertheless, history suggests that they need not only technical skill but also a
59 great deal of persistence.

60 Biomimetics projects tend to scare off investors because such projects lack clear
61 practical applications and do not guarantee immediate gains.

62 One of the earliest biomimetics products, the adhesive material Velcro, was first
63 developed by George de Mestral in the 1940s.

64 It took years for de Mestral to perfect the design and decades for a practical
65 application to be found.

66 It was not until the 1970s that Velcro became widely used.

67 Further Questions

68 7) Why do biomimetic projects tend to scare off investors?

69 *Biomimetic projects tend to scare off investors because such projects lack clear*
70 *practical applications and don't guarantee immediate gains.*

71 8) What's one example of a successful biomimetics product?

72 *The adhesive material Velcro was one of the earliest biomimetics products.*

***Choose the correct answer from these choices.**

(35) What has led to the increased interest in biomimetics in recent years?

73 1. Products based on mosquitoes and humpback whales have experienced
74 commercial success.

75 2. Scientifically advanced countries like Japan and the United States are
76 working together to develop biometric products.

77 3. Investigations over the last two decades have shown that many of
78 Leonardo da Vinci's designs were biometric.

79 4. Scientists from many fields are realizing that designs from nature can
80 provide them with new products.

81. **(36) The creation of the Stickybot has shown that?**

1. researchers should remember evolution is not perfect and may not always produce designs worth copying.
2. researchers need not include all aspects of natural designs to develop products whose overall performance matches nature.
3. current levels of technology can prevent researchers from producing designs as effective as those found in nature.
4. Geckos are actually faster but have worse climbing ability than researchers at first believed.

82. **(37) What challenge do researchers in biomimetrics face when attempting to market their products?**

1. Investors are usually only interested in opportunities that promise profits in the short term.
2. The public reluctant to buy biomimetric products as it is suspicious of new developments in the field.
3. Biomimetrics has yet to be recognized by the wider scientific community as a respectable field of research.
4. Product development takes so long that conventional products for the same purpose are usually released first.

83. **Answers for “Further Questions”**

84. **1)** What did 83 percent of the medal-winning swimmers wear during the 2000
85. Summer Olympics?

86. *They wore Speedo Fastskin swimsuits.*

87. **2)** What’s “biomimetrics”?

88. *Biomimetrics is the field of research in which product designs are based on
89. phenomena found in nature.*

90. **3)** What’re biomimetric researchers in Japan doing?

91. *Researchers are carrying out trials of a nearly painless hypodermic needle with a
92. design based on the mosquito’s proboscis.*

93. **4)** Why have researchers in the United States been studying the humpback
94. whale?

95. *They hope to develop wind turbines that can turn even at low wind speeds.*

96. **5)** Why are researchers in the field of biomimetrics confident about imitating
97. animals?

98. *Given that natural organisms have evolved over millions of years, researchers in
99. the field of biomimetrics can be confident that they’re imitating extremely
100. efficient systems.*

101. **6)** Why couldn’t the Stickybot be used in search and rescue operations?

102. *The technological limitations mean that the robot can only climb at the expense
103. of speed—unlike the gecko.*

104. 7) Why do biomimetric projects tend to scare off investors?

105. Biomimetric projects tend to scare off investors because such projects lack clear practical applications and don't guarantee immediate gains.

107. 8) What's one example of a successful biomimetric product?

108. The adhesive material Velcro was one of the earliest biomimetric products.

解答: (35) 4 (36) 3 (37) 1

109.
110.



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3[B] – The Natural Way



Lesson10 Pre1 Chobun dokkai

AP1E 10-2

111. At the 2000 Summer Olympics in Sydney, 83 percent of the medal-winning swimmers wore the Speedo Fastskin swimsuit.

112. This revolutionary swimsuit allows wearers to glide through the water with much less resistance, thanks to a material designed to mimic the skin of one nature's fastest swimmers, the shark.

113. The Fastskin is an example of "biomimetics," the field of research in which product designs are based on phenomena found in nature.

114. This is not a new idea—Leonardo da Vinci designed aircraft in the same way—but biomimetics has taken off only in the last 10 to 15 years as more scientists from a variety of disciplines turn to nature for inspiration.

115. In Japan, for example, researchers are carrying out trials of a nearly painless hypodermic needle with a design based on the mosquito's proboscis (the thin tube that forms part of its mouth).

116. Researchers in the United States are studying the humpback whale's flippers in the hope of developing wind turbines that can turn even at low wind speeds.

Further Questions & Sample Answers

118. 1) What did 83 percent of the medal-winning swimmers wear during the 2000 Summer Olympics?

119. They wore Speedo Fastskin swimsuits.

120. 2) What's "biomimetics"?

121. Biomimetics is the field of research in which product designs are based on phenomena found in nature.

122. This is not a new idea—Leonardo da Vinci designed aircraft in the same way—but biomimetics has taken off only in the last 10 to 15 years as more scientists from a variety of disciplines turn to nature for inspiration.

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130. Researchers in the United States are studying the humpback whale's flippers in the hope of developing wind turbines that can turn even at low wind speeds.

131. wind speeds.

Further Questions& Sample Answers

132. 3) What're biomimetrics researchers in Japan doing?

133. 日本のバイオミメテックス (生体模倣技術) の研究者は何をしていますか。

134. Researchers are carrying out trials of a nearly painless hypodermic needle with a design based on the mosquito's proboscis.

135. 4) Why have researchers in the United States been studying the humpback whale?

136. アメリカの研究者はなぜザトウクジラを研究しているのですか。

137. They hope to develop wind turbines that can turn even at low wind speeds.

138. Given that natural organisms have evolved over millions of years, researchers in the field of biomimetics can be confident that they are

139. imitating extremely efficient systems.

140. Nevertheless, they face great difficulty in copying all aspects of nature's complex designs.

141. The makers of the Stickybot, a robot designed to copy the gecko lizard's ability to climb smooth glass surfaces, envisioned it being used in

142. search-and-rescue operations.

143. Unfortunately, the technological limitations mean the robot can only climb at the expense of speed— unlike the gecko, which can climb incredibly

144. quickly.

145. Mark Cutkosky, one of the Stickybot's developers, admits that in order to build the robot at all, "there are a lot of things about the gecko that we simply

146. had to ignore ."

Further Questions& Sample Answers

152. 5) Why are researchers in the field of biomimetics confident about imitating animals?

153. Given that natural organisms have evolved over millions of years, researchers in the field of biomimetics can be confident

154. that they're imitating extremely efficient systems.

155. 6) Why couldn't the Stickybot be used in search and rescue operations?

156. Stickybot はなぜ搜索救助活動に使われないのですか。

157. The technological limitations mean that the robot can only climb at the expense of speed—unlike the gecko.

158. So far, the number of commercially successful biomimetic products has been limited.

159. As technology continues to advance, however, biomimetic research may find it easier to catch up with nature.

160. Nevertheless, history suggests that they need not only technical skill but also

沢山 (たくさん) の 持続性 (じぞくせい)

164. a great deal of persistence.

計画 (けいかく) 傾向 (けいこう) がある おじげづかせる 投資家 (とうしか)

165. Biomimetic projects tend to scare off investors because such projects

実用的 (じつようてき) な 利用法 (りようほう) 保証 (ほしょう) する 即時 (そくじ) の

166. lack clear practical applications and do not guarantee immediate gains.

粘着性 (ねんちやくせい) の

167. One of the earliest biomimetic products, the adhesive material Velcro, was

開発 (かいはつ) された

168. first developed by George de Mestral in the 1940s.

完全 (かんぜん) にする

169. It took years for de Mestral to perfect the design and decades

170. for a practical application to be found.

広 (ひろ) く

171. It was not until the 1970s that Velcro became widely used.

Further Questions & Sample Answers

172. 7) Why do biomimetic projects tend to scare off investors?

173. バイオミメティックス (生体模倣技術) の計画はなぜ投資家をおじげづかせたのですか。

174. Biomimetic projects tend to scare off investors because such projects lack clear practical applications and don't guarantee immediate gains.

175. 8) What's one example of a successful biomimetic product?

176. 成功したバイオミメティックス (生体模倣技術) 製品の一例は何ですか。

177. The adhesive material Velcro was one of the earliest biomimetic products.

*Choose the correct answer from these choices.

178. (35) What has led to the increased interest in biomimetics in recent years?

179. ここ数年バイオミメティックス (生体模倣技術) についての興味を増加させているのは何ですか。

180. 1. Products based on mosquitoes and humpback whales have experienced commercial success.

商業的 (しょうぎようてき) な 成功

commercial success.

科学的 (かがくてき) に

181. 2. Scientifically advanced countries like Japan and the United States are working together to develop biometric products.

投資家 (とうしか) 10年間 (ねんかん)

182. 3. Investigations over the last two decades have shown that many of Leonardo da Vinci's designs were biometric.

科学者 (かがくしゃ) 分野 (ぶんや)

183. 4. Scientists from many fields are realizing that designs from nature can provide them with new products.

与 (あた) える

184. (36) The creation of the Stickybot has shown that? Stickybot の創作は以下のことを示している。

研究者 (けんきゅうしゃ) 進化 (しんか) 完璧 (かんぺき)

185. 1. researchers should remember evolution is not perfect and may not always produce designs worth copying.

含 (ふく) む

発展 (はってん) させる

186. 2. researchers need not include all aspects of natural designs to develop products whose overall performance matches nature.

全体 (ぜんたい) の

現在 (げんざい) の

187. 3. current levels of technology can prevent researchers from producing designs as effective as those found in nature.

有効 (ゆうこう) な

実際 (じっさい) に

188. 4. Geckos are actually faster but have worse climbing ability than researchers at first believed.

189. **(37) What challenge do researchers in biomimetics face when attempting to market their products?** バイオミメティックス (生体模倣技術) の研究者が彼らの発明した製品を市場に広げようと試みた時、どのような試練に直面しますか。
投資家 (とうしか) 興味 (きょうみ) がある 機会 (きかい)
190. **1. Investors are usually only interested in opportunities that promise profits in the short term.**
191. **2. The public reluctant to buy biomimetic products as it is suspicious of new developments in the field .**
世間 (せけん) 気 (き) の進 (すす) まない 発展 (はってん) 分野 (ぶんや) 認識 (にんしき) された
192. **3. Biomimetics has yet to be recognized by the wider scientific community as a respectable field of research.**
尊敬 (そんけい) すべき 開発 (かいはつ) 慣習的 (かんしゅうてき) な
193. **4. Product development takes so long that conventional products for the same purpose are usually released first.**
目的 (もくてき)

Review Questions



194. **1) What did 83 percent of the medal-winning swimmers wear during the 2000 Summer Olympics?**
They wore Speedo Fastskin swimsuits.
195. **2) What's "biomimetics"?**
Biomimetics is the field of research in which product designs are based on phenomena found in nature.
196. **3) What are biomimetic researchers in Japan doing?**
Researchers are carrying out trials of a nearly painless hypodermic needle with a design based on the mosquito's proboscis.
197. **4) Why have researchers in the United States been studying the humpback**
 198. **whale?**
 199. *They hope to develop wind turbines that can turn even at low wind speeds.*
200. **5) Why are researchers in the field of biomimetics confident about imitating animals?**
_ Given that natural organisms have evolved over millions of years, researchers in the field of biomimetics can be confident
 201. *_ that they're imitating extremely efficient systems.*
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The technological limitations mean that the robot can only climb at the expense of speed—unlike the gecko.
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204. 8) What's one example of a successful biomimetic product?

205. *The adhesive material Velcro was one of the earliest biomimetic products.*

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解答: (35) 4 (36) 3 (37) 1

207.



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