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次の英文を読み、下記の設問に答えなさい。

Doctors and medical researchers are often hesitant to abandon a long-established idea. So it was with the discovery that gastric ulcers*1 can result from bacterial infection. Until the mid-1990s, doctors blamed the acid build-up that supposedly caused gastric ulcers on stress and eating spicy foods, calling the causes "hurry, worry, and curry." The finding in the 1970s that drugs which block acid production [1] ulcers seemed to confirm the hypothesis that excess acid caused them. For decades, the standard treatment for ulcers in the stomach or small intestine used to be a mild-tasting diet, stress reduction, acid blocking drugs, or surgery. The idea that an ulcer was [2] due to a bacterial infection that could be easily, quickly, cheaply, and permanently cured seemed ridiculous.

Helicobacter pylori --- the key to a cure for gastric ulcer patients --- was identified in the laboratory of J. Robin Warren at Royal Perth Hospital in western Australia Warren, a pathologist*2 who examined gastric biopsies*3, realized that spiral-shaped bacteria were always present in tissue that showed signs of inflammation*4. Convinced that his observation was significant, he inspired the interest of Barry Marshall, then a medical resident, and together they [3] to isolate the source of the infection. They tried, without success, to grow the bacteria from stomach biopsies for months --- until the cultures*5 were accidentally left in the incubator*6 over the Easter holidays. Easter weekend in 1982 was a long, 4-day break and, as a result, the culture plates on which they had been trying to grow the mysterious cells taken from a stomach were left 4 days longer than the usual 2 days. With the longer incubation time, they discovered [4] a large growth of bacteria with helix-shaped cells. They called the new bug *Helicobacter pylori*.

Isolating *Helicobacter pylori* was significant, but it still did not establish whether the bacteria were the cause of the inflammation or whether they occurred as a result of it Barry Marshall proposed a way to help determine the choice between these two hypotheses. He knew he had a healthy stomach and had never had gastritis*7 or an ulcer. If the bacteria caused the inflammation, they [5] in him. So on a hot July day in 1984, Marshall decided to swallow a solution*8 containing the bug. Marshall got sick. He had headaches, vomiting*9, abdominal*10 discomfort, and irritability. Endoscopic*11 examination proved he had acute gastritis, which cleared up without treatment by the fifteenth day. A second volunteer who also took the suspect bacteria was ill for several months. A 2-month treatment using an antibacterial agent and bismuth*12 was required to eradicate the organism. Other researchers, using laboratory animals, soon confirmed the [6] link between *Helicobacter pylori* and gastritis and then a link to ulcers, too. Studies also showed an increased incidence of ulcers in persons infected with the bacteria.

Most patients with gastric ulcers have the bacteria in their stomach, as do many other people without ulcers, [7] that additional factors such as stress are also needed for ulcer formation. In about 80% of the infected people, the infection seems not to produce any ill

effects. Nevertheless, the bacteria produce a toxin --- a poison which damages the cells of the stomach wall. In susceptible people, the amount of this toxin reaches a level which overcomes a) the natural defenses of the cells and initiates the formation of an ulcer.

It took the best part, of a decade to convince doctors that these bacteria were really living in the stomach and could cause ulcers. b) Skepticism was fuelled by the fact that all bacteria would normally be killed by the large amount of acid in the stomach. Yet it was eventually found that the *Helicobacter* bacteria I 8 I partly because they live within the layer of mucus*13 which the stomach secretes*14 to protect itself against the acid, and partly because they produce the enzyme*15, urease*16 This enzyme converts urea, a chemical made by stomach cells, to ammonia which neutralizes the acidity in the mucus immediately surrounding the bacteria, creating a non-acidic microzone that protects the bacteria.

We now know that many ulcers result from bacterial infection. The realization that antibiotics can effectively cure stomach ulcers may be one of the most significant medical [9] in the 20th century. The *Helicobacter* story shows that, in a time of "big science" and "mega research projects", there is still opportunity for individual investigators to challenge accepted theories and change them, [10].

註 *1 gastric ulcer *2 pathologist 「病理学者」 *3 biopsy 「生検」
*4 inflammation 「炎症」 *5 culture 「培養菌」 *6 incubator 「培養器」
*7 gastritis 「胃炎」 *8 solution 「溶液」 *9 vomiting 「嘔吐」 *10 abdominal 「腹部の」
*11 endoscopic 「内視鏡の」 *12 bismuth 医薬用ビスマス(蒼鉛(そうえん)化合物) *13 mucus 「粘液」
*14 secrete 「分泌する」 *15 enzyme 「酵素」 *16 urease 「ウレアーゼ (尿素の加水分解を促す酵素)」

問1 [1] ~ [10]の各空欄に入るものとして最も適切なものを, それぞれ 1. ~ 5.の中から一つずつ選びなさい。

- [1] 1. reform 2. reject 3. resolve 4. relieve 5. retain
[2] 1. therefore 2. instead 3. steadily 4. barely 5. comparatively
[3] 1. stood out 2. turned out 3. worked out 4. made out 5. set out
[4] 1. on their return 2. on second thought 3. on the quiet 4. on duty
5. on purpose
[5] 1. did so 2. would do so 3. will not do so 4. would not do so
5.. do so
[6] 1. legitimate 2. causative 3. humble 4. exclusive 5. ambiguous
[7] 1. implying 2. implied 3. having implied 4. imply 5. implies
[8] 1. are similar to the acid 2. are increased by the acid
3. are protected from the acid 4. are destroyed by the acid
5. are derived from the acid
[9] 1. statistics 2. confrontations 3. regulations 4. speculations
5. breakthroughs

- [10] 1. with huge burdens to patients and their families
2. with minor effects on the public
3. with small disadvantages to challengers
4. with great benefits to society and science
5. with major advantages to researchers and doctors

問 2 下線部ア, イの齋昧内容として最も適切なものを, それぞれ ~ の中から一つずつ選びなさい。

[11] a) the natural defenses of the cells

1. substances able to reduce immune responses
2. treatment of disease with medical substances that stimulate immune responses
3. medicinal products that inhibit the growth of or destroy microorganisms
4. strict hygiene that limits the risk of infection
5. immune system's ability to resist a. particular infection or toxin

[12] b) Skepticism was fuelled

1. Recognition of the value of Warren and Marshall's discovery was enhanced.
2. Many medical researchers reserved judgment on the relevance of Warren and Marshall's findings.
3. Doubt about the significance of Warren and Marshall's research was strengthened.
4. Doctors acknowledged the importance of Warren and Marshall's study.
5. Warren and Marshall's experimental results naturally aroused suspicion in other researchers.

問 3 [13], [14] の各英文のうち, 本文の内容と一致しないものを, それぞれ ~ の中から一つずつ運びなさい。

[13]

When Warren and Marshall succeeded in isolating *Helicobacter pylori*, they were not sure whether the bacteria were attracted to inflamed tissue or caused the stomach inflammation.

Helicobacter pylori exists in some people who do not suffer from gastric ulcers as well as those with the disease.

Warren and Marshall's discovery of *Helicobacter pylori* represents a triumph of scientific detective work over conservative skepticism.

Warren and Marshall first successfully cultured *Helicobacter pylori* by intentionally leaving the culture plates in the incubator longer than usual.

Animal experiments helped medical scientists prove the role of *Helicobacter pylori* in stomach diseases.

[14]

Helicobacter pylori survives in the acid environment of the stomach by hiding in the mucus and counteracting stomach acid in its local environment.

The story of the discovery of *Helicobacter pylori* demonstrates that scientific advances can be gained through creative insights and perseverance of independent investigators.

Barry Marshall's self-administration of *Helicobacter pylori* confirmed, contrary to his expectation, the connection between the *Helicobacter pylori* bacteria and gastric ulcers.

The idea that stomach ulcers could be caused by bacteria used to be treated with intense scorn.

Warren and Marshall discovered that *Helicobacter pylori* grew more slowly than the other bacteria that were usually cultured in laboratories.