

Science Fair

『Science』で読む科学の世界

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はしがき

本書は、アメリカの伝統ある科学雑誌 *Science* のオンライン版ニュース *Science Now* の記事を題材にしたリーディングテキストです。*Science* は 1880 年の刊行以来、世界の科学界をリードする雑誌として高い評価を得ています。第一線の科学者による論文や科学の今を伝えるニュース記事は 21 世紀の科学が向かう道筋を明示し、科学を専門としない者にとってもじゅうぶん刺激的です。

本書には、分野が偏らないように、また、理系・文系の区別なく関心をもっていただけるように配慮した 15 のトピックを集めました。たとえば、ダイエットの難しさを脳の働きと関連付けて解き明かす研究 (Unit 1 Why Diets Fail)、コンピュータ処理した男性ダンサーの動きをもとに、女性をときめかせる振付けとその理由説明 (Unit 2 Dance Moves Are Irresistible)、太陽の黒点観測に基づいた地球の温度変化に対する考察 (Unit 5 Say Goodbye to Sunspots?)、伝染病蔓延のメカニズムを人と人の接触から突きとめようとするシミュレーション (Unit 8 Face to Face with Human Mobility Research)、日本人固有の腸内細菌のルーツを食習慣から導こうとする研究 (Unit 12 Japanese Guts Are Made for Sushi)、ネコがいかに効率よく舌を動かして水を飲むかを物理の視点で立証する試み (Unit 13 Cats' Tongues Employ Tricky Physics)、実用化に向けて研究が進むバイオマス由来のプラスチック製法の紹介 (Unit 15 A Greener Way to Make Plastic) などが具体例です。どのトピックも科学論説文らしい無駄を省いた英文で綴られており、明確な論旨をたどりながら科学の世界へ踏み込んでいく醍醐味が味わえます。

各章は 5 ページ構成で、テーマに沿って編者が執筆した英文 **Introduction** から始まります。手紙文、ミニリーディング、広告、ダイアログなど、何種類かのパターンを用意しました。視点や話者も人間とは決めず、ウィットをきかせた導入を工夫しました。Introduction に続くのは **In Advance** です。In Advance は全章共通の **Words and Definitions** と、章によってどちらかが配される **Idioms / Word Forms** の二つのセクションから成り立っています。最初の Words and Definitions では、記事の単語に予め慣れておくための語義確認を行います。語義を押さえたところで、すぐ下の Idioms / Word Forms に進みます。Idioms は重要イディオムの先行学習が狙いであり、Word Forms は語形変化への対応力養成が目標です。

2～3 ページ目の **Reading** が本書の中心になる科学記事です。記事の長さは約 500～700words の範囲で、各章とも、編集の観点から Part I から Part III まで三つの部分に分けました。このパート区分は、後述する Exercises の In Context と連動しているのですが、要旨を的確に把握して読み進めるのに役立つはずで、トピックについてはすでに示したとおり、科学の今を伝えるという共通項をもったバラエティ豊かな話題が集められています。ページ下には、スムーズな読解を助けるための語注を中心とする Notes を、また周辺知識の整備のための事項注 Extra Notes を配置しました。

Reading 部分の学習効果は、続く **Exercises** で確認できます。多角的な学習ができるように **In Fact**、**In Context**、**In Relation**、**In My Opinion** の四種類の練習問題を揃えました。最初の In Fact は内容真偽を問う T / F 問題です。解答するには、ポイントとなる事実関係を正確に押さえることが求められます。次の In Context は記事とテーマの再確認を意図した練習問題で、

空所補充問題とヒントつき単語穴埋め問題を解きながら各パートの要約を作っていきます。In Relation では短文の内容理解を前提に、単語・語法の知識整理に焦点を当てました。ひとつの短文につき四つの単語が登場するので、解答を導く過程で多面的な語彙力アップが可能です。最後の In My Opinion はパラグラフライティングの練習です。記事の中から答えを見つけて説明する問題もあれば、テーマに即した質問に理由を示しながら意見を述べる問題、あるいは医者や科学者になりきってアドバイスやコメントをする問題など、ユニークな演習になっています。

以上、本書は優れた素材の魅力をそのままに、科学記事の読解に慣れ親しみ、かつ英語力を向上させる工夫を盛り込んでいます。このテキストでの学習をきっかけに、論理の正確さやイメージの具体性を特色とする科学記事に、いっそう関心を高めていただければ幸いです。南雲堂編集部の皆様には、長期にわたって温かいサポートをいただきました。ここに記してお礼を申し上げます。

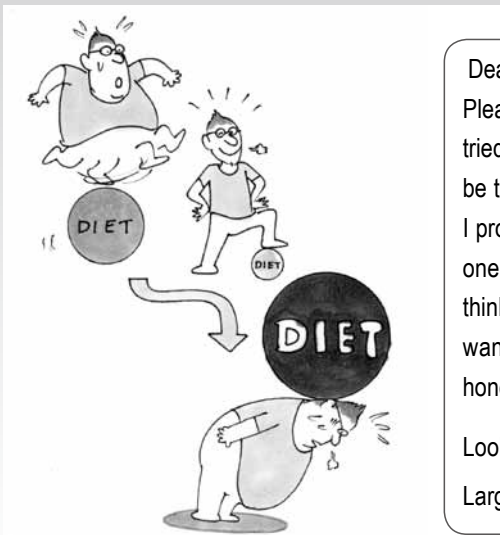
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編著者

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Unit 1 *Why Diets Fail*



Dear Dr. Tobin,

Please help me! I have been trying to lose weight and have tried every diet I could find. Each time the outcome seems to be the same. I lose some weight and feel great about myself. I promise myself I'll never get large again. But then I wake up one day and find that all the "lost" weight has come back! I think something is wrong with my body. Why does it always want to go back to being fat? I really don't eat that much, honest!

Looking forward to your advice,

Large in L.A.

In Advance

► — *Words and Definitions*

Match each word on the left with its definition on the right.

- | | |
|---------------|---|
| 1. craving | a. a small mammal which has sharp front teeth |
| 2. surgery | b. a medical treatment that uses physical means rather than drugs |
| 3. hypothesis | c. a drug or other form of medicine that is used to treat and cure disease |
| 4. rodent | d. a strong desire for something, especially for a particular food |
| 5. medication | e. an idea suggested as a possible explanation for a particular condition or phenomenon |

► — *Idioms*

Fill in the blank in each sentence with the appropriate phrasal verb.

calm down chill out focus on keep off seek out

1. When I get home I like to ().
2. If you () the problem, I am sure you will find a solution for it.
3. He left home at 18 in order to () new opportunities.
4. Counselors are trained to help angry people ().
5. The sign warned passersby to () the grass.

Reading



Part I

Chilling out might be the key to losing the weight you gained over Thanksgiving. New research shows that dieting makes the brain more sensitive to stress and the rewards of high-fat, high-calorie treats. These brain changes last long after the diet is over and prod otherwise healthy individuals to binge eat under pressure.

5 Most research on weight loss has focused on tweaking appetite regulation—helping people eat less, get full faster, and have fewer cravings. But once we lose weight, we have trouble keeping it off. Even weight-loss surgery doesn't always help people maintain their more svelte physiques.

10 Maybe, thought Tracy Bale, a neuroscientist at the University of Pennsylvania, the problem is stress. Stress causes the body to release the hormone cortisol, which fuels the blood with energy in the form of sugar, enabling us to flee from potential dangers. Over time, high stress levels lead to chronically elevated cortisol levels that can cause increased appetite and weight gain.

Part II

Bale and her co-authors hypothesized that dieting leaves people more susceptible to 15 the chronic stresses of everyday life, making even the strongest dieter yearn for a pint of ice cream or a hot, cheesy pizza. Although one hot fudge sundae won't cause significant weight gain, persistent stress could lead to a pattern of binge or comfort eating that undoes previous weight loss.

To test their hypothesis, the researchers cut daily food intake in mice by 25% for 3 20 weeks, until the rodents had lost about 10% to 15% of their original body weight. This regimen simulates a moderate diet and modest weight loss in humans. After exposure to mild forms of stress, such as loud noises, the hungry mice had higher levels of cortisol in their blood. And their cortisol levels stayed higher longer than in control mice. This indicates that the dieting mice were more stressed and took more time to calm down.

25 The mice were then allowed to return to their starting body weights to mimic yo-yo

Notes 1. **Chilling out** 「くつろぐこと」 1. **over Thanksgiving** 「感謝祭の期間中ずっと」 ⇒ Extra Notes 3. **treats** = sweet or junk foods 3. **prod ... to binge eat** 「そういうことがなければ健康な人を過食に走らせる」 4. **tweaking** = adjusting 7. **get full** 「満腹になる」 5. **cravings** = powerful desires for something この場合の something は食べ物。 7. **keeping it off** 「体重を寄せつけないこと」 it = weight cf. l.47 8. **svelte physiques** 「ほっそりとした体型」 10. **cortisol** 「コルチゾール」 11. **flee from** ~ 「~を避ける」 11. **Over time** = Gradually, With time 12. **chronically elevated cortisol levels** 「慢性的高コルチゾール値」 14. **leaves people more susceptible to** ~ 「人をいっそう~の影響を受けやすくさせる」 15. **yearn for** ~ 「~を切に求める」 15. **pint** 「1パイントカップ (容器)」 ⇒ Extra Notes 16. **hot fudge sundae** 「ホットファッジサンデー」 ⇒ Extra Notes 17. **persistent** = constant 17. **comfort eating** 「やけ食い」心を慰めるための飲食行為。 18. **undoes** ~ 「~を帳消しにする」 19. **food intake** 「食物摂取」 20. **rodents** 「げっ歯類」 21. **regimen** 「食事療法」 23. **control mice** 「対照用のネズミ」同一実験で実験要件を加えないグループのネズミのこと。 25. **mimic yo-yo dieting** 「ヨーヨーダイエットを真似る」 ⇒ Extra Notes

dieting, when people repeatedly lose and regain weight. After they had been eating standard lab chow for 1 week, the mice again underwent a series of mild stress tests to mimic the ups and downs of everyday life. The study, published today in *The Journal of Neuroscience*, reveals that ex-dieters remained more sensitive to stress than nondieters and
30 were more likely to eat large amounts of high-fat mouse chow when under pressure.

Part III

Even this short, relatively mild food reduction resulted in long-term changes in gene expression, the researchers found. The mice that dieted had significantly higher levels of the protein that stimulates cortisol release, indicating higher sensitivity to stress. These mice also had higher levels of appetite-stimulating hormones after exposure to the high-
35 fat binge food.

“This shows that environmental factors like dieting and exposure to high-fat foods can lead to long-term changes in gene expression that themselves may influence eating habits and stress response,” says Cynthia Bulik, a psychologist and director of the Eating Disorders Program at the University of North Carolina, Chapel Hill, who was not
40 involved in the study.

Changes in gene expression may help explain why so many diets fail. Dieting increases stress sensitivity, and stress makes us seek out rewarding things like high-fat, high-calorie “comfort” foods.

“Dieting is tough because your brain is working against you,” Bale says. Learning
45 better ways to cope with stress may be the key to successful weight loss because “you aren’t prone to have stress drive you to want to consume.” Bale thinks that designing medications to target these stress pathways may help dieters keep off the weight that they worked so hard to lose.

Notes 27. lab chow 「実験用飼料」 28. the ups and downs of everyday life 「日常生活の起伏」 good and bad experiences, happiness and trouble といったことを指す。 28. *The Journal of Neuroscience* 『『神経科学ジャーナル』誌』 31. gene expression 「遺伝子発現」 遺伝子の情報が細胞の機能や構造に変換される過程。 38. Eating Disorders Program 「摂食障害プログラム」 42. seek out ~ 「~を求める」 42. rewarding things 「満足感を与えてくれるもの」 45. cope with ~ 「~に対処する」 46. aren’t prone to ~ 「~に陥りそうにはない」 46. have stress drive you to ~ 「ストレスがあなたを駆り立てて~するよう仕向けさせる」 47. medications = drugs 47. stress pathways 「ストレス経路」

[Extra Notes]

1. **Thanksgiving** 感謝祭はアメリカ合衆国とカナダの祝日。アメリカでは 11 月第四木曜日、カナダでは 10 月第二月曜日にあたるが、アメリカの多くの州は翌日も含めて四連休にしている。親族友人を交えて大規模な食事をすることが多い。七面鳥が代表的料理。 15. **pint** 液量単位の場合、(米) 0.473 リットル、(英) 0.568 リットル。乾量単位の場合、(米) 0.550 リットル、(英) 0.568 リットル。アイスクリーム 1 パイントは 473ml で市販されている。 16. **hot fudge sundae** ホットファッジはアイスクリームにかけるチョコレートバター。サンデーはナッツ、果物などをのせたアイスクリームのこと。 25. **yo-yo diet** ダイエットで減量したのも束の間、またもとの体重に戻ってしまうパターンを繰り返すダイエット。

Exercises

In Fact Circle T if the sentence is true, F if it is false.

1. T/F When people go on a diet, their brains become more sensitive to stress and they lose their appetite.
2. T/F A constant, high level of the hormone cortisol leads to harmful effects such as weight gain.
3. T/F Mice that were under stress were more likely to eat high-fat foods.
4. T/F Changes in gene expression caused by cortisol last for only a short time.
5. T/F The study suggests that dealing with stress could be a key factor in losing weight and keeping it off.

In Context Spell out the incomplete words. Then fill in the blanks with words from the list.

Part I

Even if you go on a diet and succeed in () weight, it will not be easy to () your new, slimmer body. This unfortunate result is probably due to the working of the hor_____ cortisol, which will () your appe_____, make you crave sugar to get more energy, and, if it stays at a high level, sooner or later cause you to gain weight. It is also known that as people experience higher levels of stress, more cortisol is () into their bloodstream.

(a) increase (b) maintain (c) losing (d) released

Part II

Researchers have developed the () that people who suffer from chro_____ stress are likely to engage in () eating. To test their theory, they put mice on a diet so that the rodents lost weight. After the slimmed-down mice under_____ a series of stress tests, they were found to have higher levels of cortisol in their blood than () mice. The researchers also discovered that when these mice were put under (), the mice preferred to eat high-fat, tasty junk food.

(a) comfort (b) control (c) hypothesis (d) pressure



Part III

Furthermore, it was found that () to high-fat foods after successful dieting caused the mice to release hormones that stimu_____ their appetite. All this hormonal activity leads to long-te_____ changes in gene (), which will result in the development of new eating (). In other words, if your (), which controls the release of hormones, directs you to eat more, you will find dieting to be a very challenging task. These research results suggest that to lose weight and keep it off, dieters must learn to cope with stress.

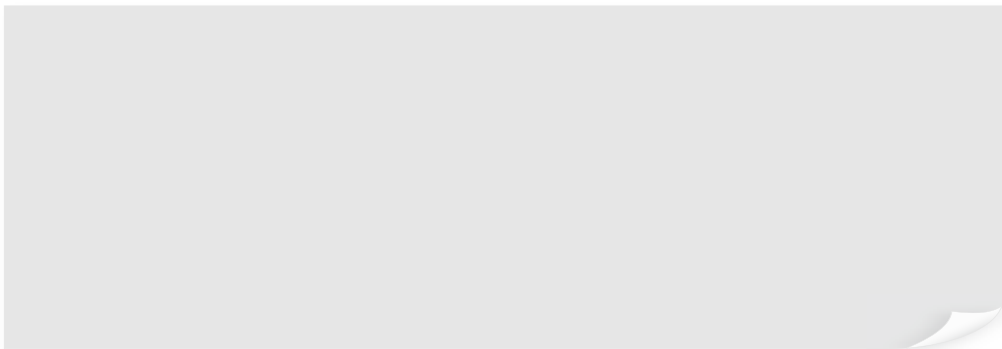
- (a) brain (b) exposure (c) expression (d) habits

In Relation Underline the word in parentheses that has a different meaning from the others.

1. He has a (continual / occasional / persistent / constant) pain in his neck.
2. This printer produces beautiful photos, even if you use (typical / ordinary / standard / special) paper.
3. Young people are usually (indifferent / responsive / sensitive / receptive) to the latest fashion trends.
4. I was surprised that the manager thought 1,000 yen per hour would be a/an (reasonable / excessive / moderate / average) wage for a part-time worker.
5. I am still using the (earlier / prior / first / previous) version of that software.

In My Opinion

You are a general practitioner, so many of your patients come to you for advice on how to lose weight. What do you, as a doctor, think of the above article? How can you use the results of the study to help your patients? Write your response in a paragraph.



Unit 2 *Dance Moves Are Irresistible*



Dan's Dancing Studio

Guys! Does the idea of dancing make you want to run away?

Don't do that—dancing is one of the best chances you have to impress the ladies! Let us help you shine on the dance floor. Our methods are based on scientific research and are guaranteed to help you get admiring looks as you show off your creative dance moves. But the first step is up to you! Call today for your free dance lesson!

In Advance

► — *Words and Definitions*

Match each word on the left with its definition on the right.

- | | |
|-------------|---|
| 1. torso | a. the act of lowering and raising one's head; for example, to show agreement |
| 2. avatar | b. the main part of the body, to which the head, arms and legs are attached |
| 3. nod | c. an object that is used to hurt people in a fight |
| 4. weapon | d. the feeling that good things will happen in the future |
| 5. optimism | e. an image that is used to represent a person, especially on the Internet |

► — *Word Forms*

Make the past-tense form for each word and put it in the appropriate sentence.

wave stick rate throw nod

1. Professor Potter was not in her office, so I () a note on her door.
2. He () his head up and down to show that he was in favor of the plan.
3. After he () a snowball at a passing car, his mother scolded him severely.
4. The fan () a huge flag for the entire race, and his country's relay team won the gold medal.
5. The technology magazine () the new video projector a perfect 10 out of 10.