

WHAT GOOD IS FEELING BAD?

The Evolutionary Benefits of Psychic Pain

by RANDOLPH M. NESSE

MOST PEOPLE come to me for the treatment of anxiety, but recently a new patient came in with only a simple request. "All I really need is a refill," she said, handing me a nearly empty bottle of an antidepressant medication. She had just moved from another city, and for the previous year she had been taking fluoxetine for weight loss, one of the side effects of the drug. "I lost a few pounds," she said, "but I want to keep taking it mainly because it makes me feel better." She denied feeling unusually depressed before, but she insisted that the drug made her more confident and energetic. "I used to be uncomfortable with strangers at parties, but now I can go up to anyone and say anything I want to," she said. "I don't feel nervous or worried about what people think of me. Also, I am more decisive, and people say I am more attractive. I'm usually even eager to get out of bed in the morning. Everything is just—well, better. I hardly ever feel bad anymore."

A routine psychiatric examination uncovered no history of clinical depression. In fact, even before taking fluoxetine she had had relatively few days of feeling down. She reported no family history of mood disorders, no unusual personal or family conflicts. She had sometimes felt uncomfortable in social situations, but she had not avoided giving speeches or going to parties. She denied abusing drugs or alcohol. As far as I could determine, she was a normal person whose normal feelings of distress were blocked by the drug.

Fluoxetine, commonly known as Prozac, has been on the market for slightly more than a year. In that short time it has become the most prescribed antidepressant, because it does not cause dependency and its side effects are, for most patients, few and mild. My patient had only minor insomnia and occasional nausea—and she lost those few pounds. For others, some 15 percent of patients, the side effects are intolerable, and in a few extreme cases patients reportedly became suicidal or began behaving uncontrollably after starting treatment with the drug; studies have not verified the extreme reactions

in large, controlled samples of people who use the drug.

Whatever may eventually be discovered about fluoxetine, it is clear that psychopharmacology is entering a new era. In the old days—three or four years ago—all antidepressants had side effects so annoying that normal people would not take them. Fluoxetine is one of the first effective agents with only minor side effects in a class of drugs the psychiatrist Peter D. Kramer of Brown University has called mood brighteners. Several more will be introduced within the next few years, some from whole new classes of drugs that promise even more specific actions than fluoxetine with still fewer side effects.

"So what do you think, doctor?" my patient asked. "All I really want is another prescription—unless there's some danger. Do you think it's safe for me to keep taking this?" I wrestled with the question. If the drug makes her feel better, why not give it to her? Maybe it is relieving a sub-clinical depression. Then again, it might have unknown side effects, despite its approval by the Food and Drug Administration and a year of clinical experience. But a separate possibility gave me pause: Are bad feelings somehow useful? If they are, is blocking them wise?

Consider pain and anxiety. Much as people want to avoid those feelings, each is essential in a dangerous world. Pain motivates people to avoid actions that might cause injury or death. Anxiety induces changes that make it easier to protect oneself from physical or social threats. The capacity for such feelings must have conferred an advantage in the course of human evolution. Do other bad feelings, such as jealousy and sadness, also serve worthwhile, possibly crucial purposes? If emotions did indeed come about through natural selection—whereby nature selects characteristics if they help organisms survive longer or reproduce more—then bad, as well as good, feelings are probably useful. And though specific experiences or environmental influences may modulate feelings differently in each individual, the basic capacity for the various emotions must somehow have assisted human survival. The task of understanding the evolutionary



Egon Schiele, Male Nude with Red Drapery, 1914

functions of emotions is a scientific frontier, one that urgently needs exploration, especially if psychotropic drugs are to be used wisely.

ONE DAY in the sixth grade, when I was on the playground, a friend pointed out a boy who could not feel pain. This bit of information was not a mere curiosity but a valuable warning: if the boy wanted to give someone a good drubbing, he would be undeterred by counterpunches, no matter how solidly planted. Getting up my nerve, I asked the fellow about his unusual condition. Obviously embarrassed, he said he had no concept of pain, just as someone who is color-blind cannot fathom color. Yet he seemed to feel guilt and social rejection like everyone else. Later it came to light that his moth-



Egon Schiele, Portrait of Oskar Reichel, 1910

er had to check over his entire body inch by inch every night to make sure he had not been injured. My playground group made fun of him for that, but always behind his back.

Today he is almost certainly dead. People who cannot feel pain are extremely rare and usually die in early adulthood. Their joints fail from excess strain, caused in part by the lack of the normal discomfort that makes most people shift position from time to time. The effects of multiple injuries accumulate rapidly, infections and appendicitis go unnoticed, and death from one cause or another comes prematurely. The disease syringomyelia also illustrates the utility of pain. A degeneration of the center of the spinal cord, the condition selectively eliminates pain in various parts of the body, especially the hands. Smokers with syringomyelia repeatedly let cigarettes burn down to nubbins, unaware that their fingers are being charred.

Physical pain is essential to the body's defense against future, as well as immediate, tissue injury. Years ago, a hook impaled my brother's ear while he was fishing. The acute pain moved him to extract the hook immediately (even though the fish had just started biting). And the memory of the pain arouses enough anxiety to ensure that, while fishing, he always wears a hat.

Why is pain painful? If a person simply noticed when tissue was being damaged, would the same purpose not be served? Why must suffering be involved? Surprisingly enough, there is an answer. Pain must be aversive in order to arouse the motivating mechanisms of the mind. Those mechanisms ensure that eliminating the source of pain gets the highest priority in the body's regulation of behavior, for rarely is anything more important to an individual's Darwinian fitness than stopping tissue damage. Patients with chronic pain, who are at the opposite end of the pain-arousal spectrum from my school-yard mate, know only too well the near futility of trying to ignore pain. Its urgent call for attention is crucial to its evolutionary function.

TO GAIN A broader perspective on the defensive systems of the body, consider some of the other, more elaborate mechanisms that have evolved. Many of them are triggered by disease; they include nausea, vomiting, cough, diarrhea, fever, fatigue and anxiety. Each is called forth when specialized detectors in the body warn of a threat. Nausea, vomiting and diarrhea eliminate toxins detected in the gastrointestinal tract, and coughing expels harmful matter in the respiratory tract. Fever counters infection, and fatigue prevents damage from overexertion. Anxiety protects the organism from a wide range of dangers.

Such defenses are analogous to the low-oil pressure light on an automobile dashboard. In that case it is clear the glowing light itself is not the problem; instead, the light is a protective response to the problem of low oil pressure. The dashboard indicator is one component of a system carefully designed to warn of dangerous conditions: an oil-pressure sensor set to respond at an appropriate threshold, wires for transmitting the signal, and a light bulb, positioned for visibility on the dash. If the driver has sense enough to stop, the defense system works. If instead the driver responds, say, by cutting the wire to the light, the engine is likely to be irreparably damaged.

It is important to note, however, that not all manifesta-

tions of disease are defenses; many are a result of a defect in the body's machinery. Paralysis, seizures, tumors and jaundice, for example, serve no function; they merely reflect a breakdown in the workings of the body. They are analogous to a clank in the transmission, a plume of steam from an overheated radiator or the silence one gets when turning the ignition key of a car with a dead battery.

The distinction between defenses and defects calls attention to the usefulness of defenses—and the dangers of blocking them. Physicians well know that suppressing a cough can turn a routine pneumonia into a life-threatening illness. It is also true—though not so commonly known—that blocking diarrhea can aggravate certain infections and increase complications. And forcing a fever down can prolong an illness. Even low iron levels in the blood, which often accompany chronic infections, counteract bacteria by depriving them of a crucial mineral. Physicians unaware of that defensive role may unwittingly aid a pathogen by prescribing iron supplements.

Defects, in contrast, are useless. Physicians need have no trepidation about trying to stop seizures, paralysis or jaundice. Furthermore, defects in themselves are not painful, except when they disrupt normal function. Most tumors come to medical attention only after they form noticeable lumps or when they interfere with a bodily function. Kidney failure can be quite advanced before a person notices anything wrong. And a person may be alerted to a weak leg muscle only by scuffs on the toe of one shoe. The capacity for pain is present only where, in an evolutionary sense, it has been able to help. As the evolutionist George C. Williams of the State University of New York at Stony Brook pointed out in his 1966 book *Adaptation and Natural Selection*, damage to the heart or the brain was so often fatal in the natural environment that the capacity for pain or even repair in those tissues would have been irrelevant to survival.

Thus the presence of bad feelings is most reliably associated with defenses, not defects. Nausea, diarrhea, cough, fatigue and anxiety all are distressing; they must be to carry out their protective functions. Indeed, one can argue that all bad feelings are components of defenses. Natural selection has molded each kind of bad feeling to help protect against a specific threat. A person who does not experience nausea as aversive is liable to eat the same toxic food again and again; a person who does not get fatigued will suffer damage to muscles and joints.

EMOTIONAL SUFFERING can be just as useful as physical discomfort. Emotions adjust a person's response to the task at hand. In that sense they are similar to computer programs, which adjust the setup of the computer to carry out a certain kind of task. The program may change what appears on the screen, the functions of certain keys, how memory is allocated, or the way information is processed. Like computers, living organisms are faced with a variety of challenges. The behavioral, physiological and cognitive responses that help a person elude a tiger are different from those that help woo a lover or attack a competitor. Thus fear, love and anger are highly distinct psychological subroutines gradually shaped by natural selection to improve the person's ability to cope with each challenge.

All emotions can help in certain situations but hinder in

others. Anxiety is welcome when it aids escape from a pack of wild dogs, but it can become a clumsy intruder at delicate moments in courtship. Conversely, though romantic fantasizing may enhance courtship, it can fatally distract a person fleeing wild dogs. Emotions are excellent examples of the "Darwinian algorithms" described by Leda Cosmides and John Tooby, psychologists at the University of California at Santa Barbara, in the 1987 book *The Latest on the Best: Essays on Evolution and Optimality*.

When a tiger bounds toward you, what should your response be? Should you file your toenails? Do a cartwheel? Sing a song? Is this the moment to run an uncountable number of randomly generated response possibilities through the decision rule? . . . How could you compute which possibility would result in more grandchildren? The alternative: Darwinian algorithms specialized for predator avoidance, that err on the side of false positives in predator detection, and, upon detecting a potential predator, constrain your responses to flight, fight or hiding.

Why are emotions always positive or negative, never neutral? As the biologists Randy and Nancy Thornhill of the University of New Mexico have pointed out, circumstances that pose neither opportunity nor threat arouse no emotion. Why should they if they are unrelated to Darwinian fitness? A falling leaf rarely stirs any feeling, unless perhaps it is seen as a symbol of mortality. A tree leaning precariously over one's bedroom, however, arouses anxious apprehension that is quite unpleasant. If anxiety were pleasant, would people not seek out bedrooms under large, dead, leaning trees, instead of avoiding them?

There are more negative emotions than positive ones—twice as many, by one count. The imbalance arises because people encounter only a few kinds of opportunity, and so—in the Darwinian sense, again—they need only a small number of positive emotions. Happiness, excitement, joy and desire motivate people to take full advantage of each opportunity. Threats, however, come in many forms—predators, poisonous small animals, disease, exposure, starvation, exclusion from a group, loss of allies, loss of stored food, loss of territory, loss of a mate and on and on. Consequently, many distinct patterns of response have been developed to contend with those threats.

OF ALL THE NEGATIVE emotions, anxiety is the most obviously useful. Although there are many kinds of anxiety, the well-known fight-or-flight response, first described by the American psychologist Walter B. Cannon in 1915, best exemplifies the value of anxiety. In the dangerous environment of early humans the response was highly beneficial for the frequent occasions when life was in danger. The strong, rapid heartbeat that accompanies panic anxiety brings extra nutrition and oxygen to muscles and speeds the removal of wastes. Muscle tension prepares for flight or physical defense. Shortness of breath induces rapid breathing, hyperoxygenating the blood. Sweating cools the body in anticipation of flight. Greater production of blood glucose also helps bring more nutrition to the muscles. Secretion of adrenaline into the blood makes it clot faster, should injury occur. Blood circulation shifts from the digestive system to the muscles, leaving a cold, empty feeling in the pit of the stomach and a tense readiness in the muscles.

Accompanying all those physiological changes are psychological and behavioral ones. A person having a panic

attack puts aside concerns about paying debts and fantasies about having sex to focus all mental energy on assessing the danger and determining the best means of escape. Often, even before finding out what the danger is, the person makes behavioral adjustments, standing ready to take headlong flight at the slightest provocation.

Social dangers pose equally severe threats. Many of my patients tell me they are too sensitive to social pressures; they are deathly afraid of being left out of a group, and they feel they must always please people. Typically, they have tried hard, sometimes with the help of a therapist, to overcome those "insecurities." They often think they should have high self-esteem regardless of social opinion. But imagine what would happen to a relentlessly self-confident person in the natural environment. Such a person would have no qualms about challenging the leader or doing other things that would cause exclusion from the group. Then the outcast might well walk off confidently onto the savanna, a response that would almost certainly end in death.

The political scientist Robert Axelrod of the University of Michigan has described some of the many ways individual human relationships depend on the exchange of favors and the adherence to certain rules. Within any network of social obligations one has many chances to violate the rules to gain a short-term advantage over one's fellows. In my view, it is the conscience that advocates following the rules and accepting the short-term costs of rule compliance for a chance at greater long-term benefits. But primitive unconscious drives lobby for violating the rules to exploit the immediate opportunity. People usually forgo ephemeral gains to avoid risking the relationship, thanks in large part to anxiety that arises out of guilt or fear of punishment. According to one of the more widely accepted findings of psychoanalysis, anxiety is aroused by socially unacceptable unconscious wishes. It thus inhibits actions that would give immediate pleasure but cause the loss of long-term rewards. Anxiety, even the vague kind that seems to have no specific source, is often useful.

Of course there are circumstances in which anxiety is excessive and serves no purpose. Although the capacity for the state came about through natural selection, environmental variables—early childhood experiences, for instance—and genetic differences affect the individual's susceptibility to anxiety. Those influences are widely recognized. But psychiatry has yet to fully acknowledge the value and evolutionary origins of anxiety and other bad feelings, though the psychiatrists Isaac M. Marks of the University of London and Brant Wenegrat of Stanford University have begun leading the field in that direction.

ANOTHER EMOTION that often seems useless and damaging is jealousy. In a cross-cultural study of sexual jealousy the psychologists Martin Daly and Margo Wilson of McMaster University found such jealousy present in every culture they investigated. Moreover, it was consistently more intense for males than females. Male sexual jealousy is simpler than anxiety in that it defends against a fairly circumscribed threat—sexual infidelity; hence it need not arise in a variety of forms. In another sense, though, it is more complex, because it is a swirl of diverse, conflicting emotions—anger, loneliness, sadness and unworthiness, among others. For all the research on it, jealousy is still widely misunderstood.

Several years ago a patient came to me because he felt he was excessively jealous. "I am constantly jealous of my wife," he told me. "I even follow her to find out what she is doing. I know it is wrecking the relationship, but I can't help it." When I asked him whether he had any reason to be jealous, he said, "Well, she goes out a few nights a week with another man, but she says they are just friends, and that she will leave me unless I can be less jealous and give her more freedom."

He felt jealousy was abnormal and had never considered that it might be valuable. As the anthropologist Donald Symons of the University of California at Santa Barbara has pointed out, in the course of human evolution a man who did not experience jealousy would risk his wife's becoming impregnated by other men and thus having fewer children of his own. Without jealously guarding his mate, he could never be certain about who was the father of her babies. He would then run the further risk of investing effort in the parenting of other men's children, diverting effort from his own. In present times, as women achieve more power, male jealousy is becoming less beneficial to fitness, since fewer women will tolerate an intensely jealous spouse. Furthermore, there is no doubt that jealousy in the extreme has provoked men to behave destructively and abuse their mates. Nevertheless, in the long run and on average, the moderately jealous man has had more children. Jealousy in women has different cues and other motivations, which would require a separate, lengthy discussion; suffice it to say, it is directed primarily toward ensuring survival of her offspring by keeping a male provider from deserting her for another woman.

ELUCIDATING the evolutionary origin of sadness poses a special challenge. It is easy to see how happiness can be beneficial; it motivates people to seek out and meet new people, attempt difficult tasks and persist in the face of adversity. But sadness is another story. Not only does it seem maladaptive; it also is increasingly viewed as a socially unacceptable result of wrong thinking or of bad genes. When I lecture on the utility of emotions, the question invariably arises: What benefit could sadness possibly confer?

The hypothesis I favor is that mood regulates the allocation of resources. High mood allocates energy, time and social resources to the enterprises most likely to pay off. Low mood withdraws investments from wasted enterprises. According to the principles of resource allocation developed by workers in behavioral ecology, every animal must decide at every moment what to do next—sleep, forage, find a mate, dig a den. All those activities are important, but each must be done at the right time and in proper proportion. Even a single activity such as foraging requires complex decisions about which foods to pursue and how to divide the effort among the accessible patches of land. Any animal, whether wolf or wasp, that pursues less than optimal prey or does not choose the best time to pursue it will lose out in the long run.

People also must make decisions about where, when and how to invest their resources. Shall I write a paper, paint the living room, read a book or clean the basement? At every moment people are deciding. Life's important decisions are usually questions about whether to maintain the status quo or to change patterns of resource allocation.

Making changes is not easy. The life circumstances people fashion for themselves generally require substantial investments in education, physical skills, social skills, relationships and reputation. Changing long-term strategies—gaining, leaving or changing a mate; switching careers; setting new life goals—is risky business. It requires, at the least, giving up on major life investments and starting anew, usually at a lower level, in some new arena. Such a change also usually entails a period of uncertainty, as one experiments with new possibilities. Because of the risks, it is wise not to undertake such changes lightly; it is often better to persist in an enterprise that is, for the moment, not paying off. A mechanism that induces people to stay with their current life strategies despite fallow periods might be quite useful.

Evidence of such a mechanism appears in recent research showing that most people are consistently overly optimistic. Shelley Taylor, a psychologist at the University of California at Los Angeles, has reviewed extensive work showing that, on average, normal people believe that they are more highly skilled than they really are and that they have more control over their environment than they actually do. Furthermore, other work shows that people generally think fewer bad things will happen to themselves than to others. Many depressives, in contrast, seem to be brutally accurate in their assessments of themselves—not pessimistic, merely accurate. Normally, people see the world through rose-colored glasses. That optimism is just what is needed to get people to persist in temporarily unprofitable enterprises and to stay with good relationships that are not going well at the moment.

When efforts fail repeatedly, however, the rose tint fades, and people become harshly realistic about the future and their friends, abilities and problems. When things are bad enough long enough, illusions must be abandoned to make major changes possible. If a farmer plants a field three years in a row and it washes out every year, it is time to stop. If a man is turned down by every beautiful woman he asks for a date, it is time he consider other types. If a person is repeatedly passed over for a promotion, it may be time to change goals or look for another position. As the Swedish psychiatrist Emmy Gut has pointed out, depression often arises when a primary life strategy is failing and no alternatives seem available. She argues that the withdrawal and rumination characteristic of depression help motivate a deep reassessment of life goals and strategies.

The loss of a relationship through death or separation brings on a special form of sadness: grief. Although it can motivate people to prevent such losses, grief is an unusually harsh teacher. An adequate explanation of its function does not yet exist; the links between behavior and psychodynamics must first be more clearly defined and the complexities of attachment taken into account.

ANOTHER SCHOOL OF THOUGHT argues that mood helps people adapt to their social position. In the 1960s the English psychiatrist John Price proposed that primates exhibit low-mood characteristics when their continued membership in a group demands that they submit to others. The idea has been supported in experiments by the psychiatrists Michael T. McGuire and Michael J. Raleigh of the University of Cal-

ifornia at Los Angeles, who showed that the dominant males in the social hierarchy of vervet monkeys have high levels of blood serotonin, a chemical that acts as a messenger between neurons in the brain. When the dominant male is removed from the colony, however, and can no longer rule the others, his serotonin level plummets. He stops eating, huddles and appears to be deeply depressed. Intriguingly, many antidepressants, including Prozac, work by increasing serotonin in the brain. In another experiment the UCLA investigators removed the dominant



*Egon Schiele, Young Woman
Covering Her Face with Her Hands, 1911*



Egon Schiele, *Embrace*, 1915

monkey from each of twelve groups, and gave one of the two remaining males in each group a drug that increases serotonin. In each case the drugged monkey became dominant. The next experiment, it seems to me, is to give the drug to a submissive male while the dominant male remains in the group: I suspect the normally submissive monkey, spurred by raised serotonin levels, would foolishly challenge the leader and get beaten back into his usual place in the hierarchy. One can only wonder whether widespread use of antidepressants might similarly be tampering with the mechanisms that regulate human social hierarchies.

Several alternative explanations for sadness have been proposed. For example, perhaps it serves as a cry for help. Just like an infant's wail, sadness can elicit aid from relatives. Indeed, communication is an important function of sadness; after all, it is often marked by distinctive facial features and tears. But if the only purpose of sadness were communication, it should take place almost exclusively in public. That is evidently not the case; people often feel saddest when they are home alone at night. Some investigators think sadness may aid creativity by somehow giving people access to unconscious thoughts and feelings, but few conclusions can yet be drawn because of a lack of data and uncertainty about how creativity influences fitness. To get to the heart of sadness, the next step is to find people without the capacity for mood and to look for any disadvantages they share. If the resource-allocation hypothesis is correct, for instance, such people ought to waste substantial effort in useless enterprises and yet be unable to take full advantage of brief windows of opportunity.

AN UNDERSTANDING of the functions of negative feelings would give psychiatry the tools it needs to treat patients more effectively. Currently the field often tacitly assumes that bad feelings are caused by some defect in the brain, and many investigators are preoccupied with finding the neurochemical mechanisms that mediate anxiety and depression. People do inherit susceptibilities to depression and anxiety. In some cases, the susceptibilities certainly come from brain defects. Such conditions are true diseases arising from faulty regulation and are comparable to an excessive immune response. But if sadness is useful, a tendency to depression might better be compared with a propensity to vomit readily or to get high fevers than with diseases such as epilepsy or tuberculosis. Some people may simply have their baseline level of mood set too low, a condition called dysthymia. For others the gain of the system is excessive, causing moods to fluctuate wildly in response to ordinary events. In the clinic that condition is described as cyclothymia or, if it is severe, manic-depressive disorder.

Rather than assuming that negative feelings are symptoms of a physical abnormality or a dysfunctional personality, family or society, the therapist can consider the possibility that some suffering is part of a vital mechanism shaped by natural selection to help people survive in their environment. For many of my patients it is a wonderful revelation to realize that there are benefits to the capacities for various kinds of unhappiness—that there is some sense to their suffering. The new perspective allows them to quit blaming themselves and others and to concentrate instead on making their lives better.

If the mechanisms that regulate the emotions are products of evolution, it might seem to follow that interfering with them will usually be unwise. After all, natural selection has had millions of years to shape the mechanisms, and so by now their thresholds should be set to near-optimum levels. But everyday medical practice contradicts that conclusion. People routinely take aspirin for pain and fever with few untoward consequences; antinausea and antidiarrhea medications relieve much suffering with only occasional complications; ten million Americans each year take anxiety medications, yet there is no epidemic of risky behavior. Nature may seem overly protective, in part because the earliest human environments presented many more dangers than modern industrial society does. People today face few tigers in the street. The readiness to panic may have been a great boon at the oasis, but it is a bane at the grocery store. Exclusion from a social group may have been fatal back then, but today it is not.

A changed environment may not be the only reason defenses seem overresponsive. Be it vomiting, fever or a panic attack, a defense is usually cheap in terms of calories lost and time taken from other activities. But if the defense is not expressed when it is needed, the cost can be enormous. The absorption of bacterial toxins into the stomach, a mauling by a tiger or rejection by a mate can exact huge costs. If the defense is to protect from every instance of danger, the threshold for response must be set low, so low that many false alarms will occur—thus the illusion that the defenses are overresponsive. Patients with agoraphobia, a fear of open places, say they feel silly avoiding a place where they once had a panic attack. But if they are asked what the best response would be if years ago they had been attacked by a tiger at that spot, most quickly realize that a hundred false alarms would be worth a single escape from an attack.

EMOTIONS ARE SET to maximize Darwinian fitness, not happiness. In that dismal conclusion is a kernel of optimism. If much suffering is unnecessary, there should be many occasions on which it can be safely blocked—throughout much of the lives of chronic depressives, for instance. Given the growing power of drugs to influence feelings, top priority should go to gathering the knowledge needed to distinguish the safe occasions from others, in which bad feelings are vital. If we continue to let only side effects or dependency dictate the use of psychotropic drugs, people will take new agents to change their feelings at will, with little idea of the purposes those feelings serve. It is time to make a vigorous study of the evolutionary functions of emotions.

Until that takes place, psychiatry is increasingly going to find itself in a quandary. Indeed, with little knowledge about when bad feelings are useful, I felt quite lost with my new patient, trying to decide whether to refill her prescription. I finally agreed to let her have a few more pills, but I also asked to see her again to explore her life in more detail. And I vowed to do whatever possible to further the understanding of the evolutionary functions of emotions. ●

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