

How the Mind Was Designed

Evolutionary theory is yielding rich new insights into everything from cognition to sexual desire

BY GEOFFREY COWLEY

Let us now consider man in the free spirit of natural history," Harvard biologist Edward O. Wilson boldly proposed in 1975, "as though we were zoologists from another planet completing a catalog of social species on Earth." As the aliens tried to make sense of human life, he reasoned, they wouldn't ignore the principles that govern the rest of life. They would assume that humans evolve by natural selection, and that their social behavior is shaped by the Darwinian struggle to survive and reproduce. Wilson proceeded in the closing pages of "Sociobiology," his massive study of social behavior in the animal world, to talk about matters like love, war, art and religion as mere branches of biology. And he set off the intellectual squabble of the decade.

Wilson's critics detected an ugly political message in his call for a new science of human nature. To them, sociobiology sounded suspiciously like Social Darwinism, a perversion of evolutionary theory that confuses social privilege with genetic superiority. Students demanded his dismissal, and colleagues accused him in print of reviving the ideas that "led to the establishment of gas chambers in Nazi Germany." By the time the shouting died down, even those who shared Wilson's outlook were reluctant to use his terms. But the idea didn't die. Today scientists are applying evolutionary theory to a host of human enigmas, and their work is yielding rich insights into everything from sexual attraction and domestic violence to the mechanics of thought itself.

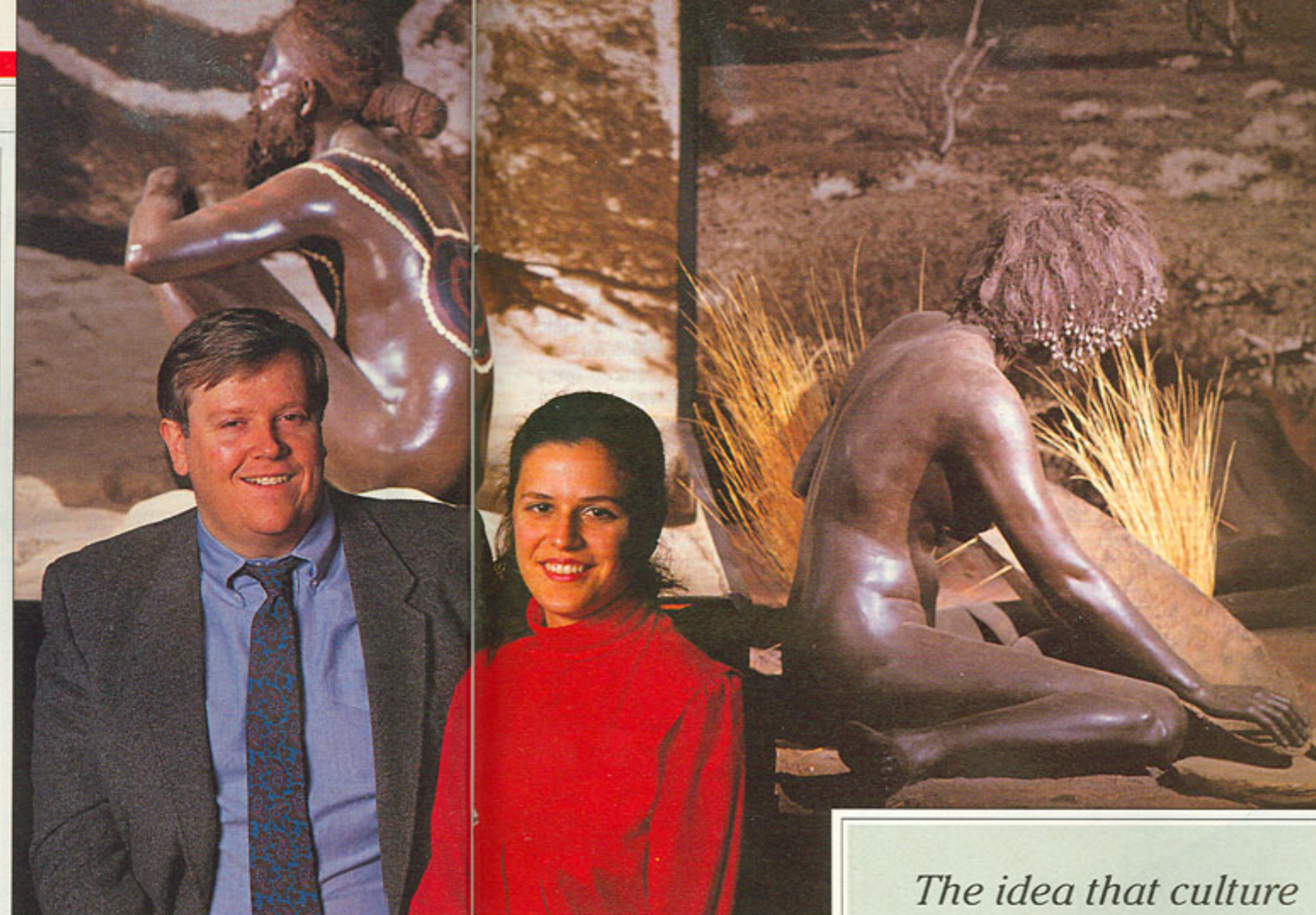
These researchers start from the accepted fact that genes are the basis of all life, and that natural selection preserves those genetically based traits that contribute the most to successful reproduction. They figure the brain has been shaped by the same pressures as any other organ, and they find that simple notion a rich source of hypotheses about how it should work. The brain and nervous system should be well wired for

sexual attraction, for example. But what forms should attraction take? In order to be of any evolutionary value, sex has to result in offspring who will survive to produce offspring of their own. And the likelihood of that depends to a large degree on the partner one chooses. It follows that natural selection should have programmed human beings to find certain qualities attractive.

David Buss has spent the past several years trying to ferret out those mating preferences. Specifically, the University of Michigan psychologist wants to know whether natural selection has equipped men and women with different impulses. Many scholars insist, of course, that "cultural conditioning" is the ultimate source of any difference between the sexes. But evolutionary theory looks to the fact that males and females operate in what amount to different environments. Because males produce millions of sperm daily, from puberty through senescence, their ability to reproduce is limited only by their access to fertile mates. Females, by contrast, ovulate but a few hundred times during their childbearing years—and turning an ovum into a person requires immense labor and energy.

The mating game: The question, from a Darwinian perspective, is this: how, given their different opportunities to send genes into the future, would each sex be expected to tackle the project? For a female, the important thing would be to avoid squandering her limited supply of eggs. Her genetic survival would depend on finding a mate with the resources to provide for the offspring he fathers. The male's key task would be to find a female capable of bearing one. His most valuable clues about a mate would be the physical ones suggesting fertility.

So evolutionary theory predicts an imbalance. But does the predicted pattern exist in nature? To find out, Buss devised a questionnaire that lets people describe their ideal mate in five categories—earning capacity, industriousness, youth, physical attractiveness and chastity—and administered it to 37 groups of men and women in 33 different societies. It was the



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largest such sample ever amassed. And the results, reported in the current issue of *Behavioral and Brain Sciences*, supported his prediction.

Despite their geographic and cultural diversity, the people surveyed consistently expressed the same patterns of preference. Again and again, Buss found that females placed greater value on wealth and ambition while males were more sensitive to signs of youth and fertility. Finding a mate who is a "good financial prospect" was more important to females than males in 36 out of 37 groups, and "good looks" were more important to males than females in all 37. There was also a clean sweep on age preferences, with males preferring younger mates and females preferring older ones.

Not everyone accepts that Buss's findings demonstrate innate biological differences. Zoologist Gerald Borgia notes, for instance, that 27 of the societies Buss studied have been exposed to European influences, which might account for the pattern. Psychologist Linnda Caporael makes a similar point. "Both sexes may want the same financial resources," she writes, "but because women are systematically denied independent access to them, we may conclude that . . . women select the most practical remaining option."

Buss's defenders readily concede that

cultural conditions shape people's preferences. Culture, they say, is precisely the phenomenon that needs to be explained. The question is which of the available hypotheses does the best job. Evolutionary theory predicts that different cultures will have certain similarities, and the available data support the prediction. If cultures are not constrained by innate human tendencies, anthropologist John Tooby and psychologist Leda Cosmides argue, then they should vary as much in one direction as another. "The assertion that 'culture' explains human variation will be taken seriously," they write, "when there are reports of women war parties raiding villages to capture men as husbands."

Attraction isn't the only emotion getting the Darwinian treatment. Martin Daly and Margo Wilson, of Ontario's McMaster University, want to know why family members kill one another. According to the well-established principle of "kin selection," any creature will tend to favor genetic relatives over nonrelatives. So domestic violence should be fairly rare. Why, then, is it so pervasive? To find out, Daly and Wilson analyzed voluminous cross-cultural data,

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dating from the Middle Ages through the mid-1980s, and they came to an arresting conclusion. They discovered that violence is rare among true relatives, just as the theory predicts. "Blood kin may be relatively immune from lethal violence," they found—even though a person is more likely to be hit or killed at home than anywhere else.

Consider the plight of stepchildren. Daly and Wilson found that they are far likelier than natural children to die of abuse, whether they live in England, Australia or North America. Most stepchildren grow up without being abused, of course. Yet, as Daly and Wilson note starkly, an American child "living with one or more substitute parents in 1976 was approximately 100

times more likely to be fatally abused than a same-age child living with genetic parents." The risk was independent of such factors as poverty, family size or even "personality characteristics of the abusers."

Spouses kill each other even more often than they kill their stepkids, and the usual motive is not hard for an evolution-minded scientist to guess. Just as physiology gives males and females different reproductive opportunities, it exposes them to very different risks. If a male animal occasionally cheats on his mate, the most she stands to lose, in the reproductive sweepstakes, is his help and attention. By contrast, a single indiscretion by the female can commit her mate to a lifetime of labor on behalf of someone else's genes. Male animals often stem the potential threat by bullying or sequestering their mates. And Daly and Wilson found that human males are no exception. They discovered in reviewing the literature that male jealousy and proprietariness constitute the leading reported cause of spousal homicide, and lie behind most nonlethal wife-beating, too.

Cerebral software: John Tooby and Leda Cosmides are more interested in reasoning than in wife-beating. When the Stanford-based husband-and-wife team talk about the mind, they talk like cognitive psychologists. They describe a "computational system" operating according to "programming rules," which can be identified by close analysis of the way people handle mental tasks.

But these two take a novel tack. Most cognitive psychologists tend to regard the mind as an all-purpose reasoning machine. It is "equipotential," they say; it uses the same basic procedures to process any information it receives. Tooby and Cosmides find that a laughable idea. As a biological adaptation, they say, the mind could not conceivably have evolved to solve arbitrary tasks. It would have developed in response to specific problems in the natural and social environment. And the cognitive processes that served one purpose well might serve another one badly. "Suppose you had a toaster oven that used a single mechanism for baking, broiling and toasting," says Cosmides. "Your machine wouldn't perform any of its jobs very well."

Tooby and Cosmides contend that the mind uses entirely different rules to process different kinds of information, depending on its survival value. And they spend their own time working to isolate those specialized procedures. Their approach is to look at a particular realm, such as social exchange, where the logical solution to a

problem is not always the most effective one from the standpoint of survival. By giving people story problems, and analyzing the patterns in their logical errors, they get a sense of the rule actually governing the responses.

In a groundbreaking series of experiments, about to be published in the journal *Cognition*, Cosmides gave volunteers a simple logical rule—"If A, then B"—then presented scenarios that might or might not violate it. The subjects' job was to decide which scenarios required further investigation. As Cosmides predicted, people performed brilliantly when the rule was dressed as a social contract (If Harry takes a cookie, he must pay a dollar), but they were terrible at spotting possible violations of a purely descriptive rule (If Harry is in Boston, he will ride the subway). As she had predicted, the subjects were at their best only when Harry was in a position to snatch an unearned benefit.

But were the subjects' minds running an innate "look for cheaters" program, independent of formal logic, or were they just applying logic more forcefully to social contracts? To find out, Cosmides gave them *reversed* social contracts—rules that said, in effect, "If Harry pays a dollar, he must accept a cookie." Instead of busting Harry when he didn't take the treat, most subjects went right on looking for instances in which he didn't pay the buck. Their approach was perfectly illogical, since failure to pay wouldn't violate the rule. Yet as Cosmides points out, it made perfect sense from a Darwinian perspective. It embodied the kind of vigilance one needs to

survive in a real social environment.

A better model: Though these new evolutionists are searching for the roots of behavior in biology, they're approaching the task differently than some of their predecessors have. Wilson and his fellow sociobiologists have often assumed that any behavior they observe is somehow "adaptive," and that one need only figure out how it enhances the actor's genetic self-interest. As Harvard paleontologist Stephen Jay Gould and others have pointed out repeatedly, that approach degenerates easily into mere storytelling, and it leads to all manner of false predictions. If behavior is directly governed by genetic self-interest, one might ask, why don't more modern men hang out at sperm banks, vying for that big chance to broaden their genetic legacies? Why does anyone eat junk food or smoke cigarettes?

To avoid such pitfalls, the new evolutionary psychologists tend to work in the other direction. They acknowledge that since genetic evolution takes place over eons, not decades, there's no reason to expect a tight fit between the human psyche and its modern surroundings. It should be adapted to the Pleistocene environment in

which it has spent 99 percent of its history, they say—an environment where snakes and wild dogs posed greater hazards than carcinogens, and where getting too little fat and salt was a greater risk than getting too much.

More important, the new breed don't assume that everything people do is a direct product of natural selection. They use evolutionary theory to identify the basic problems of survival, and they look for psychological mechanisms that might have evolved to solve them. Natural selection doesn't act directly on behavior, they acknowledge; it acts on the genes that assemble the organs that make behavior possible. And no organ can be preprogrammed to maximize fitness in every situation. As Tooby and Cosmides put it, having teeth, a throat, a stomach and a colon is no guarantee against indigestion.

The big brain: Where these researchers continue to disagree with sociobiology's critics is on what is most *interesting* about the mind. Critics like Gould find the mind's potential more interesting than its purpose. "Our large brains may have originated 'for' some set of necessary skills in gathering food, socializing, or whatever," he wrote in 1980, "but these skills do not exhaust the limits of what such a complex machine can do."

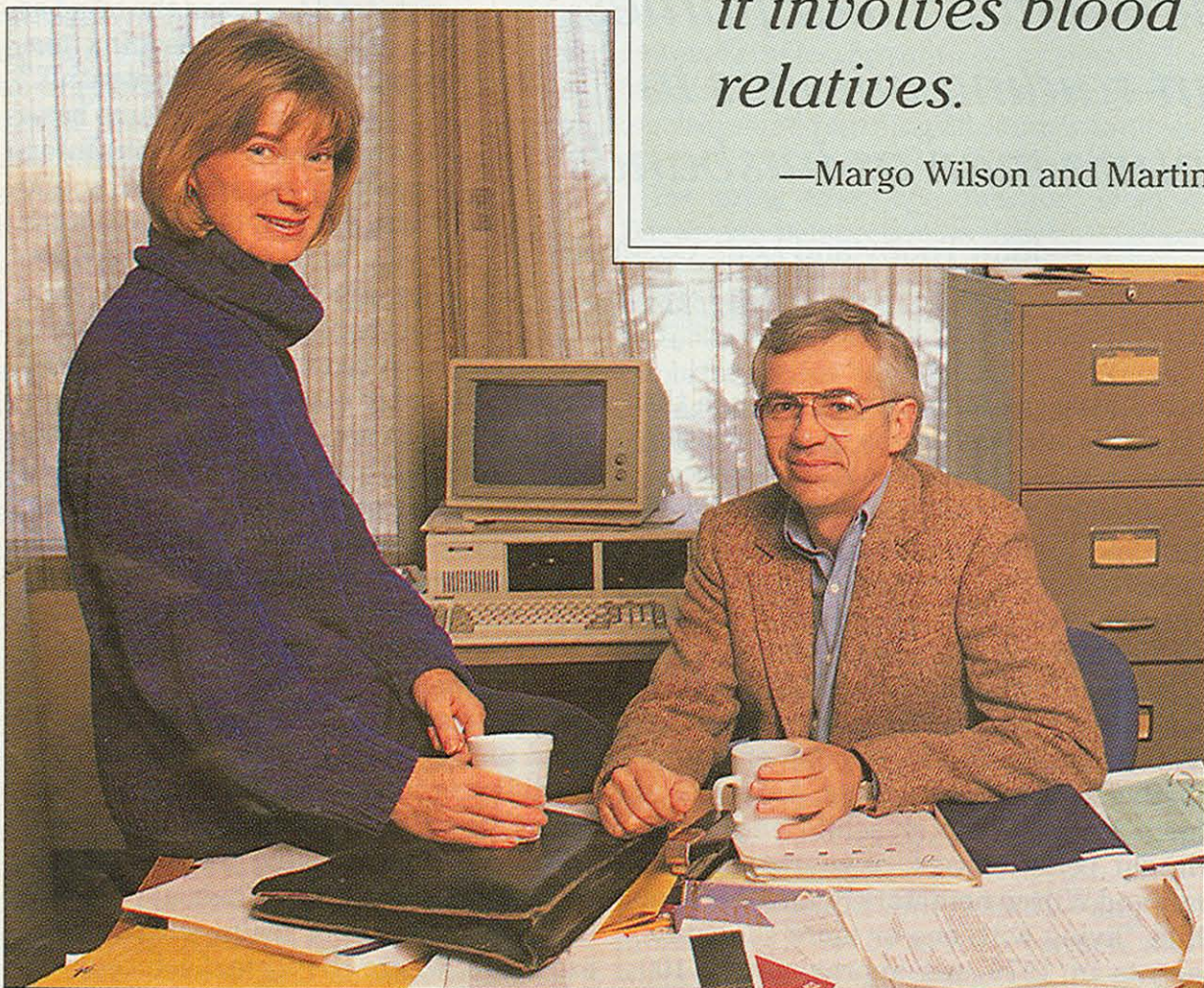
No one denies that. The mind is clearly capable of doing all manner of things that have nothing to do with the propagation of genes. It can memorize state capitals, read comic books, even ponder its own design. But if one cares to know how the mind works, listing the things it can do is not very illuminating. "It's like analyzing a toaster and discovering that you can use it to heat things, or to hold down paper, or to hit your adversaries on the head

and kill them," says Cosmides. "You don't end up with a very coherent idea of its internal logic, and you don't have any way to generate hypotheses about it."

Knowing that the mind was designed by the dictates of survival is like knowing that a toaster was designed to heat bread. It provides clues about what's going on inside, and it rules out countless possibilities. "Because they have developed almost entirely innocent of Darwinism," anthropologist Donald Symons observes, "the social and behavioral sciences have...lacked a sound criterion for recognizing significant observations." A hundred years ago, the same could have been said of all the natural sciences. Evolutionary psychology is still in its infancy. But it holds open the possibility that we'll someday know ourselves as intimately as we know our surroundings.

Though much violence takes place in the home, little of it involves blood relatives.

—Margo Wilson and Martin Daly



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