Need a prescription to forget that man who got away? Want a pill to make your new squeeze crazy-in-love over you? Then tune into the tinkers who are...

Fine-Tuning Your Sexual Pleasure Centers

By Judith Hooper and Dick Teresi

☐ Philip K.'s first sexual encounter with a woman was not an ordinary one. The place was New Orleans, in a room completely blacked out by curtains. The woman, a lady of the evening, had been paid fifty dollars for her services. Nothing extraordinary there, except that Philip did not arrive at the tryst equipped like the typical flush-faced male virgin with a brand-new foil-wrapped condom surreptitiously tucked in his wallet up against his student ID. He did have a secret weapon, however: an electrode lodged in his septum, deep within his brain. Wires streaming out of his head were threaded through a hole in the wall and into the room next door, where scientists were recording his brain waves. They also assisted in the brief affair by sending pulses of electricity into Philip's septum to stimulate his interest in the prostitute. Despite the less-than-romantic ambience, the young lady was cooperative, Philip was attentive, and the affair was a success.

Why so much equipment for a simple act of love? Philip, a man in his midtwenties, was no ordinary virgin. He was a schizophrenic. And a confirmed homosexual who had never before been able to function with a woman (although he desperately wanted to). An electrode in his pleasure center changed all that, at least for the afternoon. Philip and his electronic gear proved, quite dramatically, that passion is not an affair of the heart but resides in a different tissue altogether.

The Second-Favorite Organ Comes First

Woody Allen once called the brain his second-favorite organ. But, in fact, all sexuality, all pleasure, all sensation starts in the brain, not in the genitals or anywhere else. When your boyfriend rubs you the right way, his touch, whether on the small of your back or the nape of your neck, is really felt and interpreted in your brain. Your elation over seeing an old friend or getting a new job or the serenity you feel during a religious experience can be traced to electrochemical reactions in that three pounds of soft gray matter packed inside your skull. And today, scientists are mapping the anatomy of pleasure, finding out which parts of the brain control which emotions and how to elicit specific feelings on demand.

The quest for electrical brain control goes back to 1953, when a young American named James Olds, working at the Montreal Neurological Institute, made one of the

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great serendipitous discoveries of our age. Believing he had sunk electrodes into the hypothalamus of a white rat's brain, he stimulated it every time the rat wandered into a certain corner of its cage. Since stimulation of the hypothalamus, a master control center at the brain's core for basic drives and visceral functions, is highly unpleasant, Olds expected the rat to eventually avoid that particular corner. Instead, the animal developed a compulsive fondness for it. A postmortem look at its brain showed why: The electrode wasn't in the hypothalamus at all but in a mysterious area just above it called the septum. This was the pleasure center that Olds and colleague Peter Milner would make a household word.

The River of Reward

Olds went on to explore the topography of this pleasureland throughout the next decade, and he soon found it was a whole pathway—or, as he termed it, a river of reward—rather than a distinct center. Olds and Milner let their rats stimulate themselves by pushing a lever that activated the electrodes in their heads. Bypassing the mundane pleasures of food, water, and sex for the joys of lever pushing, some would press the magic button thousands of times, often for twenty-four consecutive hours, until they passed out from exhaustion or hunger. Thus it was demonstrated that animals will give up real pleasure in favor of direct intracranial stimulation.

But is a human being's river of reward so easily tapped? Enter Robert G. Heath, chairman emeritus of the neurology/psychiatry department at the Tulane University School of Medicine in New Orleans. Dr. Heath pioneered the implantation of deep-brain electrodes in humans and, like Olds with his rats, outfitted some of his patients with self-stimulators on a device hooked to their belts. Whenever the urge struck, a patient could push any of four buttons, each connected to an electrode implanted in a different part of his brain. One man—Philip K., the homosexual schizophrenic—pushed the button for the septal region fifteen hundred times an hour while Heath showed him stag films, which, in turn, led the subject to desire women and resulted in the experiment with the prostitute.

Does this mean that we humans are no more advanced than Olds's self-stimulating rats? Many experts, including LSD prophet Timothy Leary, have predicted that we'll soon all be wearing septal electrodes as an avenue to instant gratification. But Heath warns that life will never be so simple. To begin with, humans do not lose interest in things like food and sex when given the chance to self-stimulate. What's more, says Heath, "if a patient was feeling good, he self-stimulated less often; if he was depressed, he got a much more dramatic pleasure response from stimulation. We had one patient at the state hospital who suffered from narcolepsy [brief attacks of deep sleep]. He stimulated quite a bit, and he got a little horny from it. He went out and started fooling around. I think a jealous husband shot him in the foot."

Dr. Heath's Strange Home Movies

When Dr. Heath performed his initial experiments on mental patients at Tulane back in 1950, it was the first time anyone had implanted electrodes in human brain tissue and left them there to record deep-brain waves while a patient talked, recalled the past, hallucinated, or had a seizure. His Tulane group also electrically stimulated sites in the limbic system—the ring of interconnected brain structures that is our emotional core—thus triggering instantaneous rage, joy, or fear.

Fortunately for posterity but not so for Heath, he and his colleagues made movies of these human experiments and screened them for fellow scientists. Alas, the psychiatrists, neurologists, and neurosurgeons who saw the films did not hail Heath's work as a medical miracle but accused the doctor himself of mind tampering—when, in truth, he was able to help seemingly hopeless patients who previously had been relegated to straitjackets and shock treatment. As Heath is quick to point out, Philip K., for one, was not being used as the subject in a bizarre sexual experiment but was actually being treated for schizophrenia (stimulating the pleasure centers can relieve the disease's symptoms). In many other patients, Heath's electrodes alleviated catatonia, rage, fear, chronic pain, and epilepsy. It was only as a by-product of this therapy that he also charted our river of reward.

The Thirty-Minute Orgasm

One connection along this pathway of pleasure that Heath and company were able to make is that a good female orgasm has marked similarities to an epileptic fit—and that the former can be induced chemically. This discovery came about when, along with the depth electrodes, Heath's team surgically implanted a sort of tube called a cannula, through which they then delivered precise amounts of a natural chemical transmitter known as acetylcholine directly into the brain (Oriental sacred texts—and Aldous Huxley's *Brave New World*—mention a legendary bliss drug called soma, the food of the Himalayan gods, of which acetylcholine may be the real-life version). Once the chemical was injected into the septal area, vigorous activity showed up on the electroencephalograph (EEG) used to record the brain waves, and the patient usually reported intense pleasure—including multiple orgasms lasting as long as thirty minutes.

Heath has a remarkable movie of the brain-wave recordings of a forty-year-old woman who was being treated for epilepsy with acetylcholine. In the film, a clinical voice-over accompanies the procession of brain waves across the screen: "Now we're coming to the start of the changes. . . . It's in the form of a fast spindle, about eighteen per second . . . first in the dorsal right anterior septal, then it spreads to the other septal leads. . . . This is still correlated with the same clinical findings of intense pleasure and particularly of a sexual nature. . . ."

Half an hour after the acetylcholine injection, the woman is still having orgasms. Heath points to an ominous-looking scrawl on the EEG and notes, "See, it looks almost like the spike-and-dome pattern of epileptic seizure. It's a very explosive activity." Lest you think this kind of epileptic orgasm is peculiar to women or to patients with epilepsy, Dr. Heath says that one of his schizophrenic male patients had the same brain-wave pattern, and he also achieved multiple orgasms, just like the forty-year-old woman.

Is this the future of sexual fulfillment? Wires in our brain or a few drops of acetylcholine fed in through a cannula? Heath doesn't think so. "It's a little drastic to have a hole punched in your skull," he says, "unless you're very, very ill." But Heath does believe his method could serve as the basis for developing techniques that are less invasive. Ultrasound, for one, could be used to activate precise centers of the brain without having to go inside the skull. "Another way of doing it," says Heath, "is through pharmacological means." In other words, a pleasure pill. But Heath says this would require knowing exactly which chemical in the brain activates the pleasure mechanism, sexual or otherwise, and then designing a pill that would do the same thing. And that is exactly what a whole class of brain scientists, called psychopharmacologists, are trying to do.

Receptors of Joy

In 1973, a major event occurred in neuroscience that makes this quest for psychopharmacological nirvana more than heady fantasy: A twenty-five-year-old graduate student named Candace Pert, working under Solomon Snyder at Johns Hopkins University, discovered the opiate receptor in the brain. (A receptor is like a lock, a site on brain tissue built to receive a specific brain chemical, which can be thought of as the key to that particular lock.) But why would the brain have a receptor for opiate unless it was making its own? Is the human brain so irresponsible that it would manufacture an illegal drug right over our nose? As it turns out, it is, for only two years after the discovery of the opiate receptor, scientists also discovered endorphins, natural brain chemicals that bind to it.

If the fountain of youth or the philosophers' stone had materialized in somebody's lab, it might not have stirred up so much excitement as endorphins, which have a molecular structure similar to morphine and other opiates. In short, while man has been infusing the body for centuries with opium, heroin, morphine, and other narcotics, our brains have been routinely making these drugs all along!

As everyone knows by now, endorphins do a variety of nice things: They kill pain, give us a high when we run long distances, and are even responsible for that tingling sensation down the spine when we hear our favorite song. So why not make drugs that mimic natural brain chemicals—for inducing pain relief, pleasure, and other desirable states without side effects? Why not manufacture these synthetic keys to our natural receptors?

Indeed, pharmaceutical companies are on the very brink of designing drugs that will fit cleanly into the three dozen or so types of receptors that have been identified to date (scientists suspect another three hundred may still be incognito). Not that existing drugs don't also react with the brain's receptors, but they do so in an imprecise way, haphazardly unlocking all sorts of inappropriate receptors along with the proper ones and thus causing unwanted side effects (taking such drugs is like painting your toenails by sloshing a bucket of paint over your feet). "But now, with our in vitro technology," says Paul Marangos of the National Institute of Mental Health (NIMH), "we can develop 'magic bullets,' drugs that go right to the desired receptors and bypass the others. That means they won't have a lot of side effects. All the barbiturates, antidepressants, and tranquilizers we use today were devised twenty years ago to treat worms in dogs or something."

Dr. Marangos's Magic Bullet

Researchers like Marangos and his colleagues are concentrating in particular on creating perfect antidotes to pain, depression, ennui, phobias, writer's block, addictions, nameless dread, compulsive eating, unrequited love. And one of the leading pioneers in this quest is Johns Hopkins's Solomon Snyder. "All our old drugs were discovered through accident," says Snyder, "and after we already had the drugs, we went back and figured out how they worked. Now we have the molecular tools to design a whole new line of drugs."

Take Valium, America's best-loved prescription drug, which binds to the brain's benzodiazepine receptors—but in such a scattershot way as to produce side effects like addiction and drowsiness. Now, however, in the race to develop a cleaner tranquilizer, scientists at American Cyanamid are tinkering with a compound called TZP that sticks to only one subclass of benzodiazepine receptor, thus bringing about mellowness without fatigue.

Perhaps what you need, though, is a safe sleeping pill that won't leave you with the next-day blahs. Or a drug that packs the wake-up wallop of a hundred cups of espresso but without the attendant jitters. The solution may reside in your head—in the form of adenosine, one of the brain's own chemicals, a sort of natural anticaffeine that, in the words of NIMH's Paul Marangos, "shuts off firing in a large number of different neurons [brain cells]. It puts you to sleep. Caffeine, on the other hand, shuts off the adenosine receptor and wakes you up. And the thing that excites me is that the adenosine receptor is turned off by caffeine levels well within the range of what's in your head when you drink a cup of coffee. That's a very specific effect." Farther along on the same continuum, Snyder and colleagues have created something in a test tube that is ten thousand times more potent than caffeine in blocking the receptor. It could turn out to be tomorrow's cram drug or the night-watchman's dream.

Meanwhile, the hope for the future is to create a drug that has the opposite effect, without the drawbacks of our current barbiturate sleeping pills, which, according to Marangos, "are dirty. The only way barbiturate sleep resembles real sleep is that the person doesn't respond when you talk to him. But I think you could design a safe, clean sleeping pill around the adenosine system."

Fooling Around With Fun

Brain scientists are also playing around with receptors for drugs that may enhance your attention span, improve the memory, sober you up the morning after, and perhaps even reverse senility. And they're mixing up some chemicals as well that are just plain fun.

Chief among the last is naltrexone, a drug that blocks the opiate receptors and which was first studied as a potential diet pill after scientists noticed that lab animals would eat less when given it. (When Allen Levine and John Morely of the Veterans Administration Medical Center in Minneapolis began using naltrexone in human experimentation, they had initial success with an obese, brain-damaged patient who'd eaten uncontrollably until the drug stopped her.) But what makes naltrexone so interesting is its aphrodisiac properties, if the effect on lab animals is any indication (while human studies in South Africa produced mixed results, one woman did report that the drug gave her the strongest orgasm of her life).

For those seeking pleasure of a higher spiritual order, there are EHNA and LPIA, two adenosine compounds that have put NIMH rats into a paradoxical state of quiet wakefulness, perhaps the animal equivalent of a yogi's trance. Though the rats became very still and looked zonked, their EEGs registered uncommon alertness. "We may have hit on an altered state of animal consciousness," says NIMH's Wallace Mendelson. A meditation pill for those of us too inhibited to chant or too out of shape to contort our bodies into a full lotus position? Mendelson argues that the idea of such a transcendental drug is not so farfetched. "If it does happen," he says, "it will be in the next five years."

New Fare at the Psychedelicatessen

Not every developer of designer drugs is a distinguished, lab-coated scientist working for NIMH. Psychedelic chemists are also using state-of-the-art technology to bring us a whole new generation of mood-altering drugs—some legal, some not—the most popular of which is MDMA (also known as Ecstasy, XTC, and Adam), a beginner's LSD recommended by some psychotherapists as a way of "opening the heart," allowing patients to be more emotionally forthcoming in treatment. Witness this testimonial from Rick Doblin, thirty-two, a psychedelic therapist who lives in Sarasota, Florida: "In June [1985] I took MDMA and heard Jerry Falwell speak. I'd always thought of him as intolerant, bigoted, and racist, but on MDMA I could see how he appeals to people. I learned how he operates. I learned good ways to raise money. It was one of the most educational experiences I've ever had."

Ecstasy, besides bestowing feelings of benevolence on the user, also strips away defenses, and couples who take the drug together often find themselves chatting endlessly about how much they love and respect each other. "My boyfriend and I had been bickering for weeks," says Shelly R., a teacher from Berkeley, California. "But about an hour after we both took Ecstasy, he couldn't stop telling me everything he liked about me. He sang my praises for three hours. Afterward, we made love, and it was the closest we'd been in months." The drug also tends to minimize jealousy, and Shelly was able finally to forgive her man his occasional sexual rambles.

MDMA is but one of a large family of emotion-enhancing substances. A close relative is 2CB, a reputed aphrodisiac. Another is DOET, which supposedly gives a boost to creativity, while Eve (MDE)—which differs from MDMA by a single carbon atom—allows the intellect to run free. One chemist has

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even designed a drug the sole effect of which is to distort how music sounds to the listener. And David Nichols, a Purdue University medicinal chemist, is currently applying receptor technology to the development of drugs that will zero in on our whole pleasure circuitry.

What the First Switch-Hitter Always Knew

Meantime, while waiting for researchers to come up with the perfect love potion or a remote-control stimulator for your septum, be consoled that scientists have discovered women may have a neurological advantage over men, drugs or no drugs. To wit: The female brain supplies a better orgasm than does the male brain.

This is something that's been suspected for three millennia, ever since the sage Tiresias—arguably the first transsexual—announced that, having swung both ways, sex was better as a woman. And now there's some physical evidence to back him/her up. Studies have shown that when a brain chemical called dopamine, which is necessary to psychomotor activity, sinks to pathologically low levels in men—a condition that occurs in Parkinson's disease—their sex drive is greatly diminished, yet the same is not true of women who suffer the condition, leading James Prescott, a neuropsychologist at the Institute of Humanistic Science, to speculate that female sexual behavior is regulated by different neural pathways.

Further, since psychomotor activity tends to be goal oriented, sex for men, according to Prescott, is merely reflexive, a knee-jerk reaction. The female brain, on the other hand, is less focused during sex and therefore better geared to luxuriate in the spiritual and emotional aspects of the act, which could be why women often describe orgasm as an altered state of consciousness, with sensations of floating, loss of body awareness, and feelings of unity with the partner. All of this bolsters Prescott's belief that sex in women may be experienced in the vestibular-cerebellar system, a part of the brain governing balance, touch, and movement. Men's sexual makeup, on the other hand, represents no dramatic departure from that of lower mammals.

But whether a brain belongs to a woman or a man, the scientific establishment is finally conceding that it contains circuits for ecstasy, sexual fulfillment, and joy—and we're learning to fire those circuits on demand. As Candace Pert, the discoverer of the opiate receptor, puts it, "Opiates are about pleasure, or else why would opium wars have been fought over them? And now we know the molecular structure of pleasure." As for the brain itself, this most complex of human organs is, in Pert's expert view, "just a little box with emotions packed into it."