



Book Review

THE BARMAID'S BRAIN AND OTHER STRANGE TALES FROM SCIENCE

by Ingram

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A young Navy ensign at the controls of a jet trainer begins to laugh uproariously. The plane drifts toward another craft flying in the formation, and the instructor seizes control of the plane in order to prevent a collision. Other episodes of laughter, beginning eighteen months earlier, had interrupted the young man's sleep and even officers' meetings. However, no feelings of mirth accompanied the laughter. A neurologist diagnosed an odd form of epilepsy and prescribed anti-seizure medication, which successfully treated the condition.

So begins a series of baffling and sometimes weird scientific conundrums explored by Jay Ingram in *The Barmaid's Brain*. An additional case of seizure-induced laughter came from a young woman undergoing surgery for intractable epilepsy. Stimulation of the supplemental motor cortex in the frontal lobe resulted in a similar outburst of laughter. The young woman did report experiencing mirth, although her attribution of humor to very unlikely subjects, including the doctors "just standing around," suggested that her brain was confabulating to explain (to itself) why she was laughing. The usual function of

the supplemental motor cortex is to organize complicated series of movements. However, laughter hardly seems to qualify as a series of complicated movements. Several other cases of uncontrollable laughter are described, including one that was occasioned by breathing insecticide. It lasted more than an hour and a half and was accompanied by abdominal pain from the laughter. In that case, a shot of Valium ended the episode, and the patient has apparently been free of such inopportune outbursts ever since.

Other oddities of human behavior include visions of land that may have guided Eric the Red's route from Iceland to Greenland and of bizarre mermen that frightened Norse sailors. The suggested explanation of these images was the bending of light rays by a temperature gradient in the air. Similar mirages occurred in Buffalo, NY, in 1894, when a detailed view of the Toronto skyline appeared and when Dover Castle appeared to rise above the mountain that usually hides it from Ramsgate, England.

Ingram also revisits the infamous case of the pseudopatients who were admitted to a psychiatric hospital in the early 1970s. Each reported having heard voices saying only three words: "empty," "hollow," and "thud." No other symptoms were acknowledged, and the "voices" stopped after admission to the hospital. Nevertheless, the patients were kept in the hospital for an average of 19 days, and in one case, 52 days. Conversely, when hospitals were warned that one or more pseudopatients might be requesting treatment, but none actually appeared, the staff erred in the other direction, suspecting that numerous real patients were faking their symptoms. Ingram observes

that the more stringent criteria currently in use result in more accurate diagnoses, but that nevertheless, some weaknesses in the system may remain.

The title story explores two reported characteristics of the mental abilities of waitresses. (Both reports focused on women and were published before non-sexist generic terms were commonly used.) One study examined the ability of people to draw a line to represent the water level in a glass, tilted relative to a table. More women than men mistakenly draw the line perpendicular to the sides of the glass, rather than parallel to the table. Housewives and bus drivers scored 30 and 75% correct, respectively; female and male students scored 65 and 79% correct; but waitresses and male bartenders scored only 25 and 40% correct. Ingram suggests that continually focusing attention on the position of liquid relative to the rim of a glass on a tray makes it difficult to perceive the relationship of liquid to the ground. He also observes that the waitresses undoubtedly have enhanced motor abilities to maintain the balance of the glasses. Another ability that waitresses have perfected is remembering the orders of each customer in a group, without writing them down. In one study requiring the subjects to assign 15 "drinks" (rubber stoppers with flags) to 15 "customers" (dolls dressed as men or women), waitresses achieved 86% accuracy, compared to 68% accuracy for students. Indeed, one waitress reported that on New Year's Eve her two colleagues called in "sick," leaving her alone with 150 customers. While most customers on New Year's Eve might not be the most accurate judges of their own consumption, the waitress's ability to deliver the

goods is indeed impressive.

Vignettes in the section on Curiosities of Life include the invention and spread of thievery among birds that learned to peck through cardboard caps on milk bottles delivered to front doors. (Did the knack arise spontaneously in several places? Could it have been spread by observation? Should some mysterious "morphic field" be invoked?) Another episode considers the adaptations that allowed free-living algae (*Chlamydomonas*) to evolve into the communal spheres of *Volvox*. Yet another delves into the reports in the early 1970s that planaria not only could learn, but could also transmit that learning to other planaria that ate their "educated" brethren. We also gain insight into possible reasons why moths fly to lights and whether humans evolved through an aquatic stage (which might explain our downward pointing noses, our subcutaneous fat, and our ability to hold our breath voluntarily).

Ingram examines several intriguing cases from the annals of history. What caused Joan of Arc's visions and voices? Was she schizophrenic? (No.) Did she suffer temporal lobe epilepsy? (Possibly.) Did she have a tuberculoma (an abscess caused by bovine tuberculosis) in her temporal lobe? (Perhaps, and a tuberculoma could have caused temporal lobe seizures, which could have resulted in the intense emotion and conviction of divine influence that accompanied the visions and voices.) What caused the outbreak of "witchcraft" in Salem, Massachusetts, in the 1690s? Ergot poisoning from fungus-infected rye? Other symptoms of ergot poisoning, such as diarrhea and convulsions, were not reported, and the hallucinations of the teenage girls who accused the "witches" were not shared by most others in the community. However, one man who was a visitor, the mother of one of the girls, and several animals also showed some signs of hallucinations or strange behavior. Perhaps the initial hallucinations were due to ergotism, and the attempt to explain them grew into a fabricated web that got out of control. Another historical question was whether an apparently ancient map of Vinland (now Newfoundland) is authentic. If so, it could validate legends that Norse explorers discovered North America as early as 1000 AD—nearly 500 years before Columbus. Conflicting technologies and

arguments leave the question unresolved. A final unresolved historic perplexity is whether a phalange of Greeks, lined up on a curving hillside and using a principle of Archimedes, could have used mirrors to focus sunlight on an attacking Roman fleet, causing the ships to burn.

A section on Natural Battles details the intricate precision with which antlions build their pits, ensuring that an unsuspecting ant will become a tasty meal. The ingenious experiments that revealed the nature of the T4 bacteriophage provide an interesting tale, as well as the tidbit that one fourth of human fecal matter consists of *E. coli* bacteria. Ingram also speculates about which disease is protected against by a single genetic dose of the mutation that causes cystic fibrosis. This disease arises when two copies of a mutation cause the deletion of a single amino acid from the transmembrane chloride channel, rendering it ineffective. The persistence of this mutation for up to 50,000 years, in spite of the dire consequences of a double dose for reproduction and even for life itself, suggests that some advantage must be bestowed upon carriers of a single dose of the mutation. Cholera and typhoid fever top the list of diseases against which the single mutation may offer protection, although some questions remain about the history of these diseases, compared to the history of the specific mutations. Finally, this section considers the advantages that may accrue to birds that raise the young of cowbirds. It turns out that the cowbird chicks are adept at picking the larvae of flies off of their host nestlings, thereby saving these chicks from being literally eaten alive by maggots.

The last section of the book is How Things Work. Here Ingram ponders the similarities in the movements of cathode rays and golf balls and the impossibilities of perpetual motion machines. He closes with the suggestion that a space ladder could be built, using a "geostationary" satellite (one that orbits at the correct velocity to keep it at the same point above the earth). Could the element buckminsterfullerene (a form of carbon) be used to make nanotubes, which could then be formed into incredibly strong but light ropes that could reach to such a satellite 22,000 miles above Earth's surface? Or, more dramatic yet, could it be used to fashion a "halo-bridge," with traffic

ascending, moving along the bridge. and then descending to Earth, as suggested by Buckminster Fuller in 1951 and by Arthur C. Clarke in the late 1970s?

These vignettes, on topics ranging from the submicroscopic to the cosmic and from the ancient past to the distant future, make witty and interesting reading. They are short enough to be easily finished while working out on an exercise machine or to be read aloud on the way to work. The lack, or indeed, impossibility of resolution of some of the conundrums is frustrating, although each provides interesting insights that may enhance (or bring into question) our appreciation of science, scientists, and the world we may consider to be familiar.

REVIEW BY: ELAINE M. HULL, PH.D.

Elaine Hull is Professor of Psychology and Director of Behavioral Neuroscience at the State University of New York at Buffalo. Her work seeks to understand the neural control of male sex behavior in the rat. e-mail: emhull@acsu.buffalo.edu.

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