The Moon and Madness by Niall McCrae. Charlottesville, VA: Imprint Academic Philosophy Documentation Center, 2011. 177 pp. $34.90 (paperback). ISBN 9781845402143.

I

In a paper titled "The Effect of Cosmic Influences on Physiological Phenomena" by the Danish Nobel Laureate Svante Arrhenius (1898), lunar rhythms in records of births, deaths, menstruation, and epileptic seizures were documented. Since then, more than two hundred papers have appeared in peer-reviewed scientific journals purporting to investigate lunar influence on human life. I undertook a comprehensive review of this literature in 1970, prior to the publication of my initial research report (Lieber & Sherin 1972), and I have maintained an active interest in subsequent lunar studies up to the present time. The quality of the offerings is uneven, to say the least. There are informal surveys of data covering one or two years which should not have been accepted for publication since their results are meaningless. There are opinion pieces based on cursory literature reviews that are gratuitous. Several papers that present statistical treatments of the research of others, including some large scale meta-analyses, often turn out to be one-sided polemics. So-called replication studies are often misnomers because they utilize variables and/or statistical tests that differ from those of the study they presume to replicate. There are very few prospective studies of humans to be found. Prospective research is expensive and cumbersome. The majority of published research studies are retrospective and correlative.

A distinctive publication pattern is readily discernible upon perusal of this literature. Each study showing a positive correlation between one or more behavior variables and one of the several lunar cycles (synodic, anomalistic, sidereal, ecliptic, daily lunar transit) is soon followed by a "replication" study, which invariably fails to confirm the original positive results. Apparently there are a number of *impartial* researchers who seem consciously or unconsciously committed to undoing any evidence of lunar influence. Why this should be so makes for interesting philosophical conjecture. Lunar studies are time- and space-sensitive. They require carefully selected quantifiable behavior variables and reliable statistical measurement. Slight alteration in any of these parameters can obscure the findings of a study designed to detect small effects. So it is quite easy to "disprove" a positive result.

All this has led to the preponderance of conflicting findings duly noted by the author, Niall McCrae, who usually manages to remain impartial in his reporting of the opposing dynamic forces in this challenging area of research. Though McCrae does not list any academic credentials, he implies a background in nursing administration. It was here that he first encountered the traditional

body of folklore, beliefs, and observational data that aroused his interest in learning about a possible lunar influence on hospitalized mental patients. His later work as a researcher in an academic department of psychiatry helped him to understand the modus operandi of psychiatrists as researchers. Along the way he became an insightful writer who is able to penetrate to the core of his subject, separate the wheat from the chaff, and distill the essence of what is important. His writing style is colorful and cohesive, with touches of irony and humor.

I will attempt to summarize the manuscript section by section in hopes of inducing the reader to examine in depth his richly detailed and well-referenced excursions ranging from the ancient past to the development of astronomy, cosmology, medieval asylums, psychiatry, and contemporary research. I must first acknowledge my own theoretical bias in favor of the gravitational hypothesis. The title of my second book (Lieber 1996, *How the Moon Affects You*) implies as much. Many researchers become influenced by what they perceive as the weight of the evidence—both their own and that of others. It is unlikely to affect my objectivity in assessing this author's contribution.

II

McCrae's Introduction reads like the executive summary of a business plan. He provides a brief and succinct overview of the material upon which he elaborates in the nine chapters of his text. This is a useful device for those who are too busy or may otherwise be disinclined to peruse the entire text. Additionally, the section summaries which follow may provide the stimulus to delve into certain chapters for greater detail to complement the introductory overview.

The first three chapters set the stage for the author's *fairly* comprehensive review of the world literature on lunar studies over the past century. My own review uncovered more than a dozen contemporary references that were not included in his review, but this does not necessarily detract from the essence of his findings and conclusions, which I believe accurately reflect the current state of affairs in this field. Here he traces the origins of our curiosity about possible influences of the sun and moon acting in concert on the social, cultural, and biological aspects of our civilization. His odyssey courses from ancient times to the middle ages and on through the Age of Enlightenment, culminating at the end of the eighteenth century. Eminent early physicians such as Aesclepius, Hippocrates, Galen, Paracelsus, and Richard Mead subscribed to the belief that extraterrestrial (including lunar) forces played a prominent role in a number of human maladies, especially madness and epilepsy, which during earlier times were not viewed as separate conditions.

Chapter Four details the development of psychiatry as a specialty of medicine. Defining lunacy for the purposes of English jurisprudence in the

mid-eighteenth century, Sir William Blackstone cited the general belief that changes of the moon influenced periodic episodes of psychosis in otherwise lucid individuals. At that time, large public sanctuaries such as Bethlehem Hospital (Bedlam) in London and Gheel in Belgium housed the insane in less-than-therapeutic conditions. During the early part of the nineteenth century, the public asylum movement spread across Europe and the U.S. The medical administrators of these institutions met periodically to share their observations and treatments, thus forming the nucleus of organized psychiatry. Germany became the leader in academic training and systematized diagnostic classification. Toward the end of the century, two movements took root, each traveling in a different direction. Psychoanalysis grew and influenced the intellectual discourse of the twentieth century, while experimental psychology laid the foundations for quantitative psychometric measurement of mental functioning. The last section of the chapter consists of a concise summarization of these important movements in the field of mental health.

In Chapter Five, the author attempts to referee between what appears to be opposing forces—those researchers whose results favor the lunar hypothesis and those whose results favor the null hypothesis. Following adoption of the scientific method by psychiatric researchers in the 1950s and 1960s, a flurry of papers began to appear in scientific journals, reflecting a renewed interest in testing the lunar hypothesis. The decade of the 1970s saw a lively controversy ignited in the literature which persists to the present day. McCrae tabulates the studies, both pro and con, examines the roots of controversy, deplores strident critiquing by some authors of the work of others and strives to avoid taking sides. He correctly infers that flaws in methodology account for many of the discrepant findings.

In Chapter Six the author strives to comprehend what influences our attitudes with regard to possible lunar effects on human behavior. Citing the results from several large-scale surveys published during the 1980s, he notes that belief in a lunar influence is commonly reported by a significant percentage of the general public, university students, nurses, doctors, police personnel, crisis workers, and emergency technicians. Among workers in mental health facilities, this belief is pervasive. He examines the possible role of folklore, fairytales, astrology, religion, cultural beliefs, self-fulfilling prophecy, as well as psychological constructs such as locus-of-control and attribution theory. Rather than speculate on which among them most impacts our thinking, he suggests the following: The era of the Internet provides people with a broad spectrum of ideas and readily accessible knowledge with which to form their own ideas and judgments as to the credibility of a concept.

Chapter Seven summarizes the research on biological rhythms, the biological clock, and the luminosity hypothesis. The latter infers a possible

full-moon effect on the behavior of the deranged mediated by bright moonlight. Some studies show a full-moon predilection for disturbed behavior, and others show increased seizure activity among epileptics. A case is made for the full moon resulting in disruption of body rhythms leading to sleep disturbance, which is known to induce manic episodes in patients with bipolar disorder (the modern-day equivalent of the medieval lunatic). A majority of the patients in the old asylums were likely to be bipolars and/or epileptics. Might this account for the long-held belief that mental disturbances blossomed at the full of the moon? It is noted that the luminosity hypothesis does not account for the reported findings of increased behavioral disturbance at new moon or other points in the synodic cycle.

Chapter Eight presents a noteworthy synthesis of the evidence for an *indirect* influence of the moon upon terrestrial geophysics, and subsequently upon biophysics and human behavior. The medium by which these phenomena transpire are the pervasive electromagnetic fields that bathe all terrestrial organisms and participate in all periodic processes and perturbations occurring in our solar system. A considerable body of research began to appear in the mid-twentieth century that explored how the human organism may be impacted by naturally occurring electromagnetic fluctuations in the ambient terrestrial environment. These forces, along with ion showers and cosmic radiation, emanate from our sun and are modulated on their earthward journey by lunar gravity. They may cause weather disturbances, disruptions in the transmission of radio waves, and disturbances in human physiology and biochemistry. Careful investigations of each of these intermediary variables reflect the imprint of solar and lunar cycles. The fact that much of this research, including some important applications in contemporary medicine, has been overlooked by the orthodox scientific establishment reflects a general failure to transition from linear thinking to systems thinking in the health sciences. McCrae has summarized the essential discoveries made by most of the relevant researchers in this area. He has, however, omitted some important material produced by Russian workers such as Dubrov (1972) and Presman (1970). These and other Eastern European scientists were early proponents of the importance of terrestrial geomagnetism in the regulation of life processes and the unraveling of enduring mysteries such as extrasensory perception and the biological compass. The author, who strives throughout to maintain a neutral stance, summarizes thus:

> with evidence of a small but statistically significant correlation between geomagnetism and mental disturbance, and monthly perturbations in magnetic activity caused by the moon, an indirect lunar influence on behavior via geophysical forces is in principle a reasonable hypothesis.

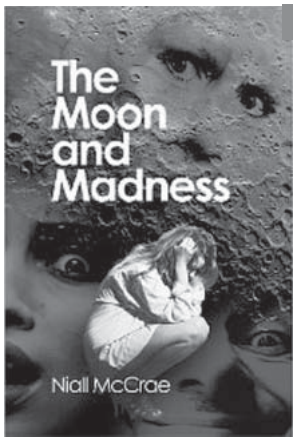
In the final chapter the author attempts to resolve his ambivalence with

regard to the existence and relevance of lunar effects on mankind. He does this by exploring the tenets of various philosophers of science during the past half-century in a futile effort to elicit clues that might inform his judgment. He would like to conclude with his statement that the bulk of research on lunar variables fails to refute the null hypothesis. However, his basic sense of fair play and a nagging feeling that there may be more to learn does not allow him to trivialize the modicum of positive studies. He feels compelled to allow for the plausibility of an indirect gravitational hypothesis. He compares the conflicting results of lunar studies with those of contemporary studies of antidepressant drugs. The latter are, in fact, no less conflicting and both leave their readers in a quandary as to how they should be interpreted. McCrae also bristles at the thinly veiled diatribes of skeptical authors Campbell and Beets, and Rotton, Kelly, and Culver, and he chides them for their strident critiquing of others' work. His conclusions from his perusal of much of the relevant world literature of the past fifty years are as follows:

1. the research findings are conflicting, hence they are confusing,
2. most of the studies consist of retrospective data correlation,
3. methodology is at a rather primitive stage of development,
4. replication studies are rarely found,
5. statistical reviews often become polemics,
6. lunar studies continue to appear despite caveats from some authors,
7. the argument for further study remains compelling.

III

My interest in lunar study began with a body of hearsay similar to that encountered by McCrae. It was supplemented by my personal observations on the wards of an acute-care psychiatric hospital and in the psychiatric emergency room of a large municipal hospital. As a psychiatric resident wishing to initiate a research project, I had to satisfy the criteria of a demanding department chairman, who was also an established researcher. I teamed with an experimental psychologist and a prominent academic statistician in developing a foolproof methodology. We then measured lunar timing of several behavior variables over long time periods and in large numbers of subjects from two widely separated locations. Over the next eight years I published three research studies and a book, and my findings were widely disseminated to the general public by the media. During the same period, a rash of conflicting results were reported by other workers. In an attempt to head off the inevitable confusion, I called for standardization of methodology for all future lunar studies (1978a) This effort was ignored, however, and to this day there remains a glaring need to establish clarity rather than the uncertainty that still prevails.



One might inquire why lunar studies are relevant at all. They are largely ignored by the scientific establishment and have been denounced by a small group of fanatical doubters among the research community. I believe there are three factors that address their relevance—the heuristic, the practical, and the philosophical. I will comment briefly on each.

The heuristic value of lunar studies is self-evident. The thrill of unmasking elemental forces that impact upon the growth, development, and functioning of the human organism is matchless in the overall scheme of discovery. Confirmation of ancient observational wisdom has also proved gratifying. The value of legend and folklore in shaping the direction of contemporary investigations should not be overlooked. For example, curiosity about the centuries-old practice of farmers applying moldy cheese to infected wounds led Fleming to the discovery of penicillin.

Applied lunar knowledge has never been systematized, and interest in practical applications has been sporadic. There is no documented evidence that gravitational forces consistently affect any given individual in a predictable manner. Nonetheless, there are surgeons who avoid new and full moon scheduling of elective surgery, there are event promoters who will not book a rock concert at these times, there are police departments that alter staffing patterns and alert their officers to be more cautious during these "high-risk" periods, and there are Wall Street firms that base their investment patterns on the coincidence of the synodic and anomalistic cycles. Almost every psychiatrist has seen patients who claim to be a "moon person." The wiser among them know better than to ridicule the concept. I used to encounter clusters of treated bipolar patients who simultaneously called in to report symptom recurrences during times of gravitational stress. Usually simple reassurance that this should pass in a few days would suffice, but I had occasion to adjust medication for some of these patients. Similar experiences were not uncommon among my colleagues, however I doubt that they attributed these recurring case clusters to geophysical stressors.

There are a number of fascinating philosophical issues concerning our subject, discussions of which could easily fill a separate manuscript or produce another volume. I will limit my present focus to three topics which I deem as timely. One of them is fortuitous and has the potential to alter the direction of science.

- The concept that all terrestrial organisms, including man, are cosmic resonators, reflecting the harmony (or discord) of the spheres dates back to W. F. Peterson (1947). Peterson noted that this idea was, in fact, quite old, having been popular among ancient philosophers. He studied three medical students who were identical triplets over a three-year period and was able to detect solar and lunar rhythms in multiple physiological and biochemical parameters, which he also correlated with weather variables. He used the term *cosmobiology* to describe his approach. There are many studies of plants, animals, sea life, humans, weather variables, and terrestrial geomagnetism that seem to embody this concept. Also there is an aesthetic fit between the idea of terrestrial organisms resonating with the cosmos and my theory of Biological Tides.

- It is interesting to speculate on the root causes of the antagonism toward lunar studies found among certain writers. I suspect there are two main fears that underlie their misgivings. Some workers are reluctant to confront the percept that there may be limitations to their free will or to mastery of their own fate. If one were to acknowledge the possibility that forces beyond our control might influence our biology and behavior, then apparently we do not possess as much freedom as we had imagined. This idea is, of course, anathema to those who need total control over their environment.

  If one accepts the possibility of a gravitational influence on human biology, then he must also recognize that a variable relevant to the design of many research experiments has been overlooked. This could alter, or even invalidate, years of research results. One begins to comprehend why some may harbor the need to disprove positive findings.

  Only those are free who are able to acknowledge the limitations of their freedom, and of their methods.

- Thirty-four years ago I alerted readers in my book (Lieber 1978b) that lunar time should be incorporated into the design of biological and behavioral experiments. Results from my research combined with a working familiarity with the literature on biological rhythms led me to an awareness that lunar rhythms coexist with solar rhythms in biological functioning. Therefore, lunar time must be an integral component of biological time. The late Professor Frank A. Brown from Northwestern University agreed with this contention. Lunar time is out of synch with solar or calendar time, advancing by 50 minutes daily across the solar

time spectrum (hence, the lunar month is about a day and a half shorter than the solar month). The difference between solar and lunar time parameters constitutes a variable that must be controlled for in the design and conduct of biological and behavioral studies. Failure to account for this difference when designing a research methodology dooms the ensuing study to inevitable replication failure. Needless to say, this admonition, which was reiterated in the revised edition of the book (Lieber 1996) was ignored, and incorporation of lunar time into research designs did not occur. On December 2, 2011, an article appeared on the front page of *The Wall Street Journal* titled *Scientists' Elusive Goal: Reproducing Study Results*. One of medicine's dirty secrets was revealed: Most results, including those appearing in tier-1 peer-reviewed journals, cannot be reproduced! The extent of this problem throughout the literature of science and medicine is vast. That same week, the journal *Science* ran a series of articles attempting to explore possible contributing factors such as flawed methodology, increased competition among authors and journals, publication bias, data fudging, the prioritizing of positive over negative studies, etc. In the end, the investigators and the editors really don't know why most studies cannot be replicated. Their search for an answer came up short. Science has finally awakened to the reality that research results simply are not replicable at our present level of understanding. This confirms my 1978 prediction. The time may be ripe for a new level of understanding based on an old principle. Perhaps scientists will now revisit this long overlooked viewpoint, as it may embody part of the missing answer.

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