require, incidentally, membrane stacks that would cover all of Central Park to a height of some 3 miles, for such is the slow rate of diffusive processes.


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We share Gregor's respect for the laws of thermodynamics; we believe our article shows that respect. As we point out in the article, the concentration-depth relationship in the oceans is far from the equilibrium one; the second law of thermodynamics makes it amply clear that one can, in principle, extract power from any such nonequilibrium situation.

We hope that in addition to teaching his students thermodynamics, Gregor teaches them to read articles all the way through, and not take parts out of context. If his students do, they will read the last two paragraphs of our article, which we hereby quote.

> In principle, at locations where the oceans are deepest the osmotic pump should be able to bring fresh water to the surface of the real ocean and the osmotic power plant should be able to generate significant electric power. However, these devices are not likely to be economically feasible at the present time. . . .
>
> One may think of this as a way of harvesting some of the sun's free energy which is stored in the nonequilibrium state of the ocean. So far, mankind has harvested such solar energy where it is more concentrated—through photosynthesis, fossil fuels, hydroelectric power, winds, and tides. There are other untapped sources of solar energy and possibilities which may be more economically attractive than this one, such as the steep temperature gradients in the tropical oceans and photovoltaic conversion. For the near future this osmotic approach seems less likely to be commercialized than others, although as we have shown here it is thermodynamically feasible.

We do not believe that anyone who reads those paragraphs will be misled about the practical prospects of the osmotic pump or power plant.

We have accepted Gregor's suggestion to calculate the power obtainable from the reversible salination of the Hudson River at New York. The reversible power would be the volumetric flow rate times the osmotic pressure. The former averages about 610 $m^3$ $sec^{-1}$ (*1*), while the latter is about 25.6 atm. Multiplying these together, we have (610 $m^3$ $sec^{-1}$) × (25.6 atm) × (1.013 × $10^5$ watt $m^{-3}$ $atm^{-1}$ $sec^{-1}$) = 1.58 × $10^9$ watts. The installed electric capacity of the United States is about 1500 watts per person, so this is approximately enough power for a population of 1 million people. The statement about "New York City and much of the hinterland" seems exaggerated.


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## Wind, Waves, and Women

In his review of *Exercise and Sport Sciences Reviews* (*1*) (31 May, p. 977) Steven M. Horvath mentions that the best time for a marathon run of 50 miles was made by a woman. The best time for a 50-mile swim is also held by a woman. The indomitable Greta Andersen beat the only other swimmer (a male) and won the race by 5 hours. The question of noblesse oblige was not involved since it was a professional race in which a $10,000 purse was involved. In my book *Wind, Waves, and Sunburn* (*2*), which is a history of marathon swimming, I called Greta the greatest female marathon swimmer in the history of the sport. Twice she won the English Channel race (21 miles), beating all the men in doing so. She is also the only person to make a round-trip swim (44 miles) of the Catalina Channel. Greta at some time in her career has beaten every man she has ever swum against. And it should be mentioned that Greta is no androgyne. She has all the right padding in the right places that characterizes the feminine woman. There are many other examples of women surpassing men in this sport.

In more than 20 years of training marathon swimmers, I have observed the following. Whenever a race is more than 4 miles long (about 1½ to 2 hours), the women begin to recoup the lead the men have taken. From that time on it becomes a toss-up as to whether the winner will be a man or a woman.

Over the years, many a University of Chicago student and professor has been humbled by one of my female students in training in Lake Michigan.

In fact, in many cases, the men have spent a whole summer whipping themselves into shape only to find that their chances of beating a woman were no more than 50-50 over the greater distances.


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## Interaction of Sperm with Somatic Cells

In their report (1 Mar., p. 857) on the novelty and potential value of the uptake of spermatozoa by somatic cells, Bendich, Borenfreund, and Sternberg fail to mention that the subject is at least as old as the observations of Kohlbrugge (*1*) and that almost all their methods were put to the same use and achieved the same results in Sydney, Australia, a decade ago (*2*). We were similarly attracted to the idea of the male gamete's being a vector of nucleic acid, particularly as a potential carcinogen in human cervical cancer (*3*). The epidemiological literature is replete with suggestions that the disease is truly venereal, and demonstrable intimacy of the two nucleic acids—those of sperm head and cervical epithelial cell—following coitus was the subject of much thought and model building by our group (*4*). Like our colleagues in the field of viral oncogenesis, we seized industriously upon the concept of an admixture of the two nucleic acids being potentially somehow carcinogenic. The concept, however, has not been as productive as we hoped. We now see the importance of the sperm head as a vector of arginine-rich histones acting not so much deep within the target cell, as the authors' electron micrographs and autoradiographs so dramatically show, but quite superficially at its surface and quite early during the first moments of contact (*5*).

The Sydney studies have been the subject of three books, review articles, and numerous papers published in many countries, including the United States and the United Kingdom. Is it possible, in an age of some of the most sophisticated communications mechanisms in the history of mankind, from satellites to computer-aided bibliographies, that the noise level generated by an avalanche of publications sets the chances of contact between scientists in related fields at a level less effective than that which obtained in Medieval times?


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We regret we did not cite the earlier work of our colleagues in the field of gynecology mentioned above; we disagree with their contention that the methods were put to the same use and achieved the same results. Our study dealt with nonphagocytic spermatozoal transfer of genetic information to cultured somatic cells. Coppleson and Reid regarded sperm as potential mutagens and presented experimental data which bear on this. They have speculated that phagocytic uptake of sperm or sperm components by immature squamous metaplastic cells in the human cervix might lead to carcinoma after a long latent period. Although they do not now regard their concept as productive as they had hoped, we believe this latter possibility to have great merit. The astonishingly high incidence of prostatic carcinoma (*1*), the anatomical possibility that sperm can play a role in this disease also, and the current difficulty obtaining direct experimental evidence on various stages of this lengthy process make it important to pursue and support systematic fundamental investigations which can be rigorously evaluated at each step.


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