LETTERS

Solving the Physics Mystery

To the Editor:

"Physics Awaits New Options as Standard Model Idles" (Essay, July 4) nicely captures the nervous state of particle physics. But one remark — that physicists have no experimental clues as to what that more overarching theory might be — is misleading. In fact, there are at least four consistent ones, and they imply that the theory is supersymmetry.

Direct confirmation of that (if true) should come soon from the Large Hadron Collider at CERN, and it could emerge even before from Fermilab.

The Standard Model describes so much data correctly that one can calculate the effect of the putative Higgs boson on the agreement of experiment and theory if the Higgs did not exist, and one finds a strong implication that it does indeed exist. The other clues involve supersymmetry's special effect on Standard Model measurements, hints of unification of the forces and dark matter.

Several measurements are known to be sensitive to the existence of supersymmetry, and most show promising effects. If nature is not tricking us, these clues should indeed point to the solution to the mystery.

GORDON KANE
Ann Arbor, Mich.

The writer is a professor of physics at the University of Michigan.

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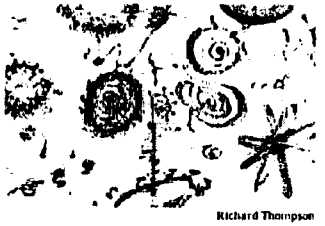
To the Editor:

Please do not assume that readers of Science Times are as ignorant of physics as your essayist claims to be ("Physics Awaits New Options"). His first few sentences seem to suggest that not only is the reader ("most of us") expected to be ignorant, but that this is somehow acceptable. Essays that send messages like this are not part of the solution.

DAVID M. BARNERT, M.D.
Albany



Richard Thompson

Choosing a Doctor by Race

To the Editor:

Re "Imperfect, Imprecise but Useful: Your Race" (Second Opinion, July 4): As the daughter of a woman who died of metastatic breast cancer, I have yet to see much discussion of noneconomic ra-

Racing to Know the Rarest of Rhinos, Before It's Too Late

By MARK DERR

A two-ton rhinoceros measuring 5 feet tall and 10 feet long, with a fondness for browsing on low-lying shrubbery, hardly seems like a difficult animal to find. Unless there are fewer than 60 left on the planet.

That is the case with the Javan rhinoceros, often called the rarest large mammal on earth and perhaps the most endangered. Like its near — and larger — cousin the Indian rhinoceros, the Javan has only one horn, compared with two for Africa's black and white rhinos and the Sumatran of Asia. The Javan, like the Indian, also has large plates of folded skin that resemble armor but do not protect against guns.

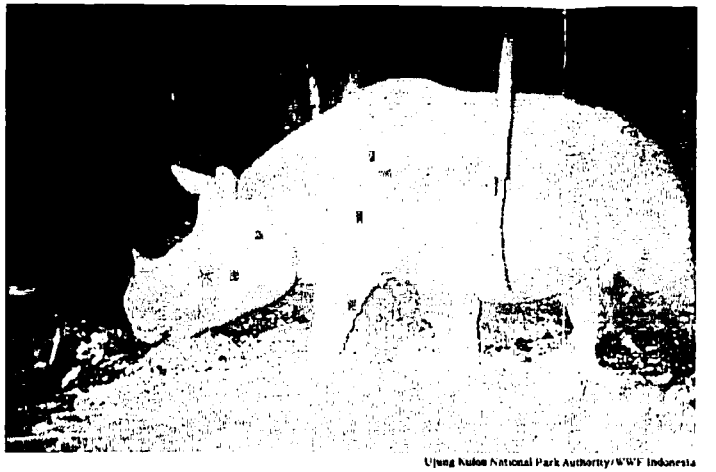
Because they lead solitary, secretive lives in remote forests in Indonesia and Vietnam, these rhinos are very hard to study: images of them come from "camera traps" activated by movement in the forest, and biologists get DNA samples from dung or from the horns and hides of dead animals.

"It is totally amazing how little we know about these animals, their mating habits and social behavior," said Dr. Prithiviraj Fernando, director of the Center for Conservation and Research in Rajagiriya, Sri Lanka. "Till a decade ago people were debating whether the females have horns." (They do.) Dr. Fernando was the lead author of a paper in the journal Conservation Genetics last month on the first detailed genetic study of the Javan rhino.

None of the rhinos exist in zoos. Without considerable luck and daring political leadership, the last Javan rhino will vanish from the Asian mainland in the next few years, leaving only those on the island of Java, whose forebears became isolated by rising sea levels 500,000 to a million years ago.

Even its island redoubt is no guarantee against extinction, say Dr. Fernando and his co-authors, an international team of scientists and conservationists. They estimated that populations might be too small to sustain: 40 to 50 animals in Ujung Kulon, an Indonesian national park on the western end of Java, and just 3 to 8 in Cat Tien National Park in southern Vietnam, half the number a decade ago.

The plight of the Javan rhino is a direct result of human actions, especially habitat destruction and hunting, Dr. Fernando said. For millions of years, the animal flourished in lowland forests from eastern India and Bangladesh all the way to the islands of Java and Sumatra, now part of Indonesia. During periods of glacial advance and low sea levels, those islands formed a land mass, Sundaland, that was connected to the mainland.



Ujung Kulon National Park Authority/WWF Indonesia

CANDID SHOT A male Javan rhinoceros, photographed by a trap camera in Ujung Kulon National Park in Indonesia. It is described as the rarest large mammal on earth.

Unfortunately for the rhino, humans favored the same habitat and had little use for a large herbivore that raided their crops. Farmers regarded rhinos as agricultural pests and often killed them on sight. In the 18th and 19th centuries, the advent of colonialism and firearms drew hunters who slaughtered thousands. By 1934, the species was all but extinct on the Asian mainland.

Devastated by the eruption of Krakatoa in 1883, the Ujung Kulon peninsula was later recolonized by rhinos and other animals but not by humans. It has since become a national park, and strong anti-poaching measures are in place. But perversely, the rhinos' numbers have barely budged since 1980; the lack of human disturbance means that mature forests and exotic plants are replacing the shrubby lowland vegetation the animal prefers.

> Because of inbreeding, health and fertility become problems.

A further problem, the scientists say, is that the remaining rhino populations lack the genetic variation they need to combat disease, adapt to changing conditions and avoid the health and fertility problems that arise from inbreeding. The situation is especially desperate in Vietnam. But Dr. Fernando said in an e-mail message, "There is still detectable genetic diversity within the Ujung Kulon animals, which tells us we can still save this population."

The task of saving the rhino is even more complicated because the Java and Vietnam populations represent different subspecies and should be managed separately to preserve any unique adaptations and mutations, said Don J. Melnick, a biologist at Columbia University and the project leader of the first Javan rhino genetic study through the university's Center for Environmental Research and Conservation. But Dr. Melnick added that it might be too late to preserve a distinct subspecies in Vietnam.

"Unless more individuals are brought into the Vietnam population," he said, "it is hard to see how it survives."

Gert Polet, a co-author of the Conservation Genetics paper and an adviser to the World Wide Fund for Nature's program to protect Asian rhinos and elephants, says all may not be lost in Vietnam. Security there has improved, Mr. Polet said, and government officials and local residents are more sensitive to the rhinos' needs.

"It is not unthinkable that there is a male and breeding is taking place," he wrote in an e-mail message. Moreover, he added, the rhinos used to venture out only under cover of darkness; "recently daytime pictures have been taken (the first ever as far as we know), indicating that the rhinos feel more at ease than before."

The Ujung Kulon rhinos face different problems, the scientists say, mainly habitat decline. But increasing the population is still their foremost aim. "We have got to get to 100 animals in the Ujung Kulon population, as a short-term goal, to stabilize the erosion of genetic variation," Dr. Melnick said.

The Indonesian forestry department has decided to improve rhino habitat in Ujung Kulon by keeping out or removing competitor species, like the banteng, a wild cow, and invasive, exotic plants that crowd out the rhino's preferred food, Adhi Rachmat Hariyadi, site manager for the World Wide Fund for Nature's Ujung Kulon National Park project, wrote in an e-mail message.

The department is also proceeding with plans to establish a second rhino population in a site to be determined, he said. No program is planned to breed rhinos in captivity, but new genetic analyses by Dr. Melnick's team, now under way, will be used to identify good candidates for relocation.

Dr. Fernando, Dr. Melnick and their co-authors also discuss more active proposals to encourage reproduction, including establishing managed breeding centers in natural settings, a plan endorsed in 1997 by a specialist group of IUCN, also known as the World Conservation Union.

Nico J. van Strien, a coordinator for the International Rhino Foundation and a co-author of the IUCN report, said the Javan rhino recovery effort had been set back by the failure of a costly captive breeding program for the imperiled Sumatran rhino, in the 1980's and 90's.

Occupying much the same range as the Javan rhino but preferring uplands to lowlands, the Sumatran rhino has two horns and hair and is slightly smaller. Although more numerous than the Javan, the Sumatran rhino is often considered more endangered, Dr. van Strien said, because its remaining habit is less secure from poachers and encroaching humans.

It is, he said, a fine and dubious distinction, since the goal is to save them both.

"Part of our purpose in writing this article was to call attention to the plight of the rhino," Dr. Fernando said. He and his colleagues hope conservation groups worldwide will help the local authorities deal with the conflicts and economic dislocation that will inevitably arise as efforts are made to expand rhino habitat in some of the most densely peopled parts of the world.

To his mind, those groups have no choice.

"Allowing a species such as a rhinoceros to go extinct in the 21st century," he writes, "would be tragic and unpardonable."

Rogue Giants at Sea: 100-Foot Waves Draw New Scrutiny