a period of time and many cell generations, mutations in the contaminating HeLa cells could occur, and result in cells with new characteristics. These mutants could then be mistaken for the original tumor cells they contaminated if extremely precise chromosomal and enzymatic analyses were not done to reveal the error.

These important results may be met with some skepticism. "Some people may try to disprove the results or point to differences between the cells, to prove separate genetic heritage," Nelson-Rees told SCIENCE NEWS. "Many people have spent hours, months, even years studying cell cultures in which the cells have been inadvertently contaminated. If it takes a prostate cell to perform a certain function in the body and you are zeroing-in on what made that cell stop performing that function and become malignant, then working on cervical cells will change your results." Many think their cultures couldn't be affected because they don't have HeLa cells in their laboratories, he said, but they may be using other suspect contaminants. New techniques have enabled Nelson-Rees and others to identify cultures that had been misidentified for years, including some presumably human cells that were actually hamster cells, and rabbit cells that were actually monkey cells.

"There is a good chance," Nelson-Rees says, "that an awful lot of work has been affected by these HeLa contaminations," including hundreds of studies over a number of years. □

Science on TV

The Ascent of Man is finally getting off the ground in the United States. This excellent 13-part television series on the scientific and cultural history of the human race (SN: 12/8/73, p. 362) has found a sponsor and will be shown to television audiences next winter. With funding from the Mobil Oil Corp. and the Arthur Vining Davis Foundations, the series will be telecast by the Public Broadcasting Service. An exact date has not been set, but the series will probably be shown weekly beginning in January. Written and narrated by Jacob Bronowski, *The Ascent of Man* was co-produced by BBC-TV and Time-Life Films. The series was also recently published as a book by Little, Brown and is being made available as a teaching aid in 16mm and video cassette formats.

PBS's other science series, NOVA (SN: 3/2/74, p. 147), is just winding up its first season and will be aired again next year as a regular Sunday night feature beginning Nov. 26. At least 18 new shows are in the works for the 26-week season. □

Ocean energy: New life for an old idea

Almost a century after the French physicist D'Arsonval first proposed the idea, the extraction of heat energy from the ocean to generate useful power is moving closer to practical application. A working model of such a generator was built in the 1930's, and recent experiments indicate that the operations could profitably be combined with mariculture to help provide power and food for countries near tropical seas (SN: 4/13/74, p. 243). Last week, hearings before the energy subcommittee of the House Science and Astronautics Committee brought the spectrum of schemes for making sea-thermal energy available into new focus.

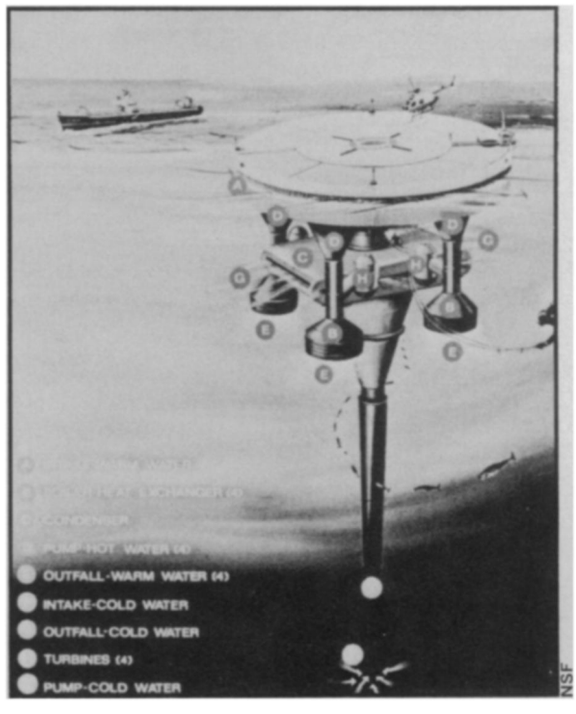
Electrical power from oceanic generators could potentially have the lowest cost of any solar-generated electricity, a panel of experts told the subcommittee, perhaps competing with conventional or nuclear sources. For a relatively modest investment, compared to R&D funds for nuclear power plants, commercial power plants could be in operation in a decade, they said.

"Successful implementation of the solar sea power concept can make the United States an exporter of fuel," predicted Clarence Zener, a physicist from Carnegie-Mellon University.

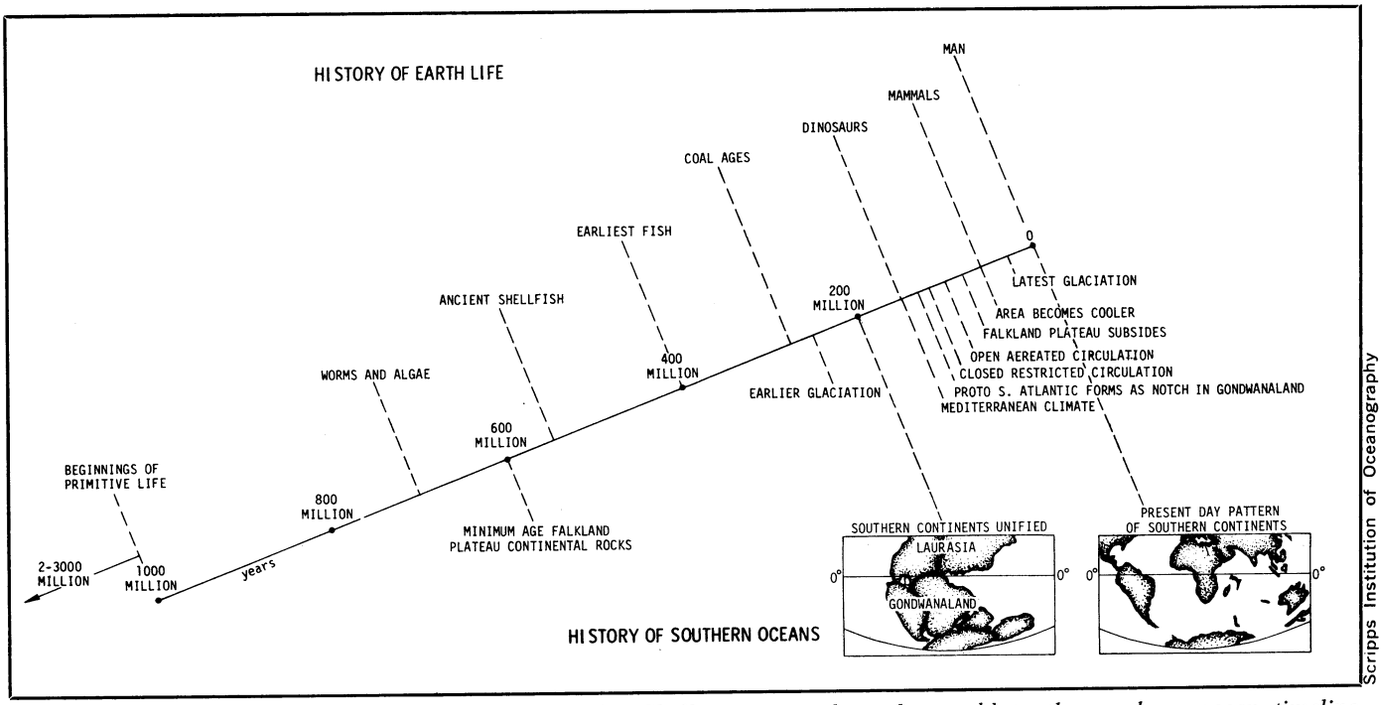
Some 45 percent of the total incoming solar energy falls on tropical seas, which form a heat reservoir whose stored energy is 10,000 times greater than present human demand. The problem that has delayed exploitation of this vast resource is its lack of concentration—temperature differences between the sea surface and the coldest depths are only about 40° F. Conventional power plants depend on heating various materials (steam or jet fuel) by hundreds or thousands of degrees. As these expand they drive turbines or pistons and thus convert heat into work. The greater the temperature differential, the more easily heat can be transformed.

Now designers believe they can efficiently convert the small oceanic temperature differences into useful energy by using them to boil and then recondense ammonia. Sea surface temperatures are above the boiling point of ammonia; temperatures at great depths, below. The expanding ammonia gas could then drive a turbine in much the same way boiling water is used to drive a steam turbine. But unlike steam engines, which must be constructed from heavy, cast metal to keep them from bursting, sea-thermal plants could be built from light-weight materials because of the surrounding inward pressure from the sea. Zener estimates that a neutrally bouyant, lightly constructed apparatus could be made from aluminum and suspended at 200 feet depth (where the external pressure is equal to the vapor pressure of ammonia) and the total energy cost of refining the aluminum would be recovered in the first few hours of the plant's operation.

But skeptics point out that several problems must be resolved before sea-thermal energy can be considered economically feasible. Because the operating temperature differential is so small to begin with, heat transfer through the thin walls of an apparatus might be cut to inoperable levels by even a thin



One concept of a partly submerged ocean-thermal power plant, making use of temperature differences between warm surface water and cold deep water.



After a storm-tossed journey around Cape Horn, the Challenger moved north to add to the southern ocean timeline.

veneer of algae growth—a constant problem in ocean-borne equipment. Corrosion must be a major consideration in the design of any seaworthy machines. Also, several of the technical advances upon which supporters base their optimism have not been proven outside the laboratory. As one subcommittee staff member observed, much of the work so far represents "back-of-an-envelope type calculations."

Legislation to provide funds to explore the less well known forms of solar energy is now in the drafting stages in Congress, and it is still too early to tell what impact last week's testimony will have. Supporters maintain that sea-thermal plants could be installed along the American coastline as far north as Charleston, S.C., and provide either electricity or stored energy in the form of hydrogen at competitive prices far inland. A spokesman for the National Science Foundation, which is funding feasibility studies by Carnegie-Mellon and the University of Massachusetts, told the subcommittee that, tentatively, at least, "there's a lot of interest in industry." □

Gondwanaland's sub-sea trail

Since the earliest days of ocean travel, the journey "round the horn" —south of Chile's Cape Horn—has been the mariner's hell-trail. On Leg 36 of the globe-spanning Deep Sea Drilling Project, scientists and crew aboard the Glomar Challenger learned the hard way that Neptune in his wrath is still to be reckoned with. Yet like the rest of the fruitful project, the journey has paid off.

Delayed by equipment problems and the uncertainties of long-term planning, the Challenger was unable to embark from Ushuaia, Argentina, scarcely 50 miles north of the Horn, until April 4, dangerously late in the season for sailors in the oceans at the world's bottom. Making its way along Drake's Passage between the cape and the Antarctic peninsula, the vessel was beset at its very first research site by violent, wrenching storms that caused the loss of more than 2.3 miles of the drill "string" that it uses to sample ocean-bottom sediments and underlying rock. Moving eastward into Antarctica's Scotia Sea, the Challenger found itself continuously under siege from raging winds and towering seas, as nervous eyes strained themselves red watching for maverick icebergs.

At last the weary explorers decided that they had had enough. Abandoning their quest into the ancient land links between Antarctica and South America, they moved north into more receptive waters to continue earlier studies of the mighty schism that drove apart South America and Africa during the long-ago sundering of the former supercontinent of Gondwanaland. By the time the ship docked at Rio de Janeiro after almost seven weeks at sea, its dozen researchers and their crew had collected 1,902 feet of cored sediment and basement rock samples from 10 holes in the sea floor.

Even in the earliest analyses, the Leg 36 team, assembled from across the United States as well as from England, Australia and Argentina, is finding out that its weather-wracked mission was a success. The core samples reveal, for example, that the remains of Gondwanaland stretch eastward almost 900 miles from the Argentine coast, submerged thousands of feet beneath the waves. The Falkland Islands, thrusting upward from this vast underwater shelf about 500 miles east of southern Argentina, yielded rocks from their depths that may be more than 600 million years old, almost half a billion years older than the continental movements that opened the South Atlantic. These rocks, together with 150-million-year-old sediments gathered from atop the shelf, are believed to be the oldest rocks and sediments recovered during the entire 258,000 miles and 488 holes of the Challenger's travels. The sediments mark the first coming of the sea onto the shelf, whose weathered rock-tops suggest that the climate at the time was more like the balmy Mediterranean than like its present incarnation.

Tiny fossils in the sediments, together with oil shale produced by the decay of organic matter, are helping to tell the story of the changing climate and ocean circulation as the fractured supercontinent went its lumbering ways. The organic remains suggest poor circulation and poor oxidation in the early history of the then-growing South Atlantic basin. The region did not really begin to resemble its present state until the shelf stopped sinking some 80 million years ago. Within 10 million years of that time, the changed circulation began carrying Antarctic life forms northward to as far as 28 degrees south latitude.

History lengthens. The story unfolds. The Challenger—sails on. □