earth sciences

Drilling in the Arabian and Red Seas

On the Deep Sea Drilling Project's Leg 23, which ended May 2, scientists drilled for the first time in the Arabian and Red Seas. One of the most interesting finds, says co-chief scientist Oscar Weser of Scripps Institution of Oceanography, was a large submarine ridge about 150 miles off the coast of southeast Arabia. The ridge, at least 300 miles long, is as much as 6,000 feet high in some places.

The researchers also found that the crust beneath the southeast Arabian Sea is older than anticipated—46 million to 57 million years old. The history of sea-floor spreading in that region, says Weser, will have to be revised in light of the new ages. The Leg 23 accomplishment of most long-range significance, Weser believes, is establishment of a complete Arabian Sea stratigraphy for the past 57 million years.

In the Red Sea explorations, the oceanographers found that the Red Sea probably opened in two phases. The first movement, about 20 million to 30 million years ago, formed the sea's general shape. Then 6 million years ago the axial valley that cuts lengthwise through the center of the sea opened.

When began continental drift?

The present phase of continental drift began about 200 million years ago with the breakup of the supercontinent Pangaea. But whether Pangaea existed intact for all geological time prior to 200 million years ago or was an agglomeration produced by previous stages of drift remains to be shown.

In the May GEOLOGICAL SOCIETY OF AMERICA BULLETIN, John H. Stewart of the U.S. Geological Survey reports that evidence of a continental separation 850 million years ago is preserved in western North America. A sinuous belt of sedimentary strata between 850 million and 550 million years old runs from Alaska to northern Mexico. He notes that the strata are progressively thicker from east to west and the pattern of deposition is different from that of underlying rocks. The sequence, says Stewart, is similar to the type believed to accumulate along continental margins after continental breakup. Evidence of volcanism near the bottom of the strata also suggests that continental separation occurred.

Rifting beneath the sands

The sand of Africa's deserts obscures geological structure in large areas of the continent and frustrates attempts at conventional geological and geophysical studies. One such region, the Kalahari desert in Botswana, has high seismicity, from which C. V. Reeves of the Botswana Geological Survey and Mines Department has drawn some inferences about Botswana's geophysical history.

The earthquake epicenters form two distinct groups, he reports in the May 12 NATURE: a dense cluster over a swampy district in the northwest and a broad belt running northeast across the central Kalahari. The belt of seismicity parallels several major features that Reeves believes are probably faults and is aligned with a major rift in Zambia. Reeves suggests that the African rift system may extend into the Kalahari, and that rifting in the Kalahari is probably a vestige of the beginning of a continental breakup that never really got going.

biochemistry

Reverse transcriptase in embryo cells

The discovery in 1970 of reverse transcriptase, the enzyme that can make DNA from RNA instead of the usual RNA from DNA, rocked the biological world. Since then, the enzyme has been found in tumor viruses, in animal and human cancer cells, and possibly in normal cells. Now Isabel Slater and D. W. Slater of the National Institute of Child Health and Human Development report evidence for the enzyme in embryo cells from sea urchins, amphibians and birds.

They discovered that partially purified enzymes from these cells were able to make DNA from RNA as well as from DNA. This finding suggests that reverse transcriptase enzymes as well as the usual DNA polymerase enzymes must be at work. But the authors caution in the May 17 NATURE NEW BIOLOGY that the real role of reverse transcriptase in embryo cells must remain provisional until the enzymes have been completely purified, their natural templates identified and their activities confirmed in whole animals as well as in tissue studies.

Calcium control over vitamin D

Biochemists are appreciating more and more the complex interactions of minerals and vitamins in the body. For example, a University of Wisconsin biochemistry team, headed by J. L. Omdahl, has found that a high-calcium diet in animals leads to increased levels of calcium in the bloodstream; less calcium absorption in bone and intestine; and most interestingly, prevention of the metabolism of vitamin D to its final breakdown product in the kidney. Apparently high levels of calcium cause a metabolite between the second-to-last and last breakdown product of vitamin D to be formed. This "peak Va" metabolite was obtained from in vitro kidney studies.

These results, reported in the May 10 NATURE NEW BIOLOGY, suggest that high dietary levels of calcium may determine how much vitamin D is available to the body. At the same time they suggest that vitamin D helps metabolize calcium that the body cannot use.

How ribosomes are built

The molecular biology revolution of the past 20 years showed that DNA, the genetic material of the cell, is copied by messenger RNA. Then transfer RNA lines up amino acids on the command of m-RNA; the resulting amino acid sequences become proteins. This genes-to-protein production takes place on solid round particles in the cell called ribosomes. These protein factories, so to speak, are made of RNA and proteins. While the proteins in the ribosomes have been extensively purified and sequenced, much more is to be learned about the structure of the ribosome.

In the May 17 NATURE NEW BIOLOGY, H. Kagawa and L. Jishuken of Kyoto University in Japan shed light on how different proteins line up along a strip of ribosomal RNA to form the larger ribosome subunit known as the 50S ribosome. Some 50S ribosomal subunits were centrifuged out and partially digested with enzymes. The RNA-protein, or ribonucleoprotein, fragments were then separated out. As a result the investigators obtained a fairly good idea of the relative position of the proteins on the digested RNA nucleotides, and have estimated a possible sequence of proteins on 50S ribosomal RNA.