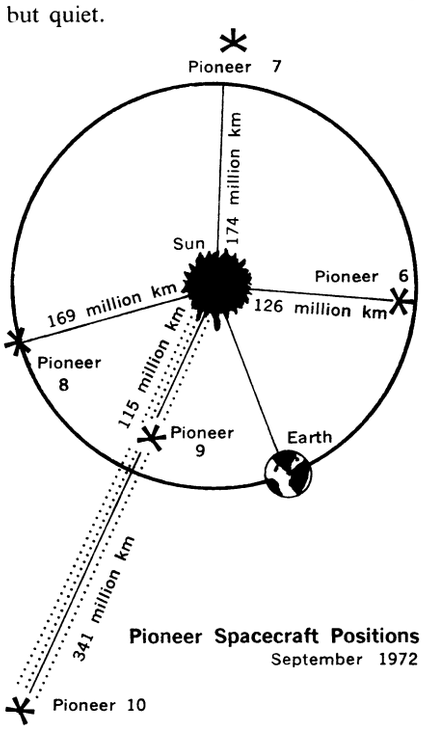
ters and 33 kilometers revealed small quantities of ammonia—between 0.01 and 0.1 percent. In a preliminary report in July, the scientists mentioned short-lived substances in the clouds that appeared to be indicative of "stormy volcanic activities on the surface." No such mention was made this time.

Venus 8 also measured wind velocities. At an altitude of 45 kilometers, the wind was moving horizontally at 50 meters per second. It decreased during descent to less than 2 meters per second. At 10 to 12 kilometers, the measurements indicated "there is a zonal, latitudinal wind directed from the terminator to the day side" in the same direction of the planet's rotation.

The surface layer of Venus appears loose and has a density of slightly less than 1.5 grams per cubic centimeter. A gamma-ray spectrometer indicated the surface soil to be "relatively rich in potassium, uranium and thorium." It contained 4 percent potassium, 0.0002 percent uranium and 0.00065 percent thorium. Tass likened these radioactive concentrations to the composition of terrestrial granite. □

5 Pioneer spacecraft observe solar storm

Plasma physicists got an extra bonus last month from five Pioneer spacecraft. John Wolfe of NASA's Ames Research Center and other scientists had planned to use a unique alignment of Pioneers 9 and 10 to measure the solar gases in a quiet state. At the time Pioneer 9 was about 115 million kilometers from the sun; Pioneer 10, about 341 million kilometers. What they saw was anything but quiet.



Pioneer Spacecraft Positions
September 1972

A solar storm was in progress (SN: 8/19/72, p. 119). Three explosions occurred on Aug. 2 and a fourth on Aug. 7. During one one-hour period, the sun produced energy equal to the U. S. electrical power consumption for 100 million years at the present rates. It caused a temporary but violent warping in the earth's magnetic field which caused power and communications blackouts on earth.

Pioneer 9 saw the highest solar wind speeds ever recorded—1,000 kilometers per second. The typical solar wind velocities are from 400 to 700 kilometers per second. The highest previously observed had been 800 kilometers per second.

By the time these solar wind particles had reached Pioneer 10, 76 hours and 226 million kilometers after they passed Pioneer 9, their velocity had decreased by half. But their temperature had risen to 2 million degrees K., far above the usual 100,000 degrees K. What happened, Wolfe believes, is that the kinetic energy of the particles was converted into thermal energy. "We've never seen anything like this before," he says of the event.

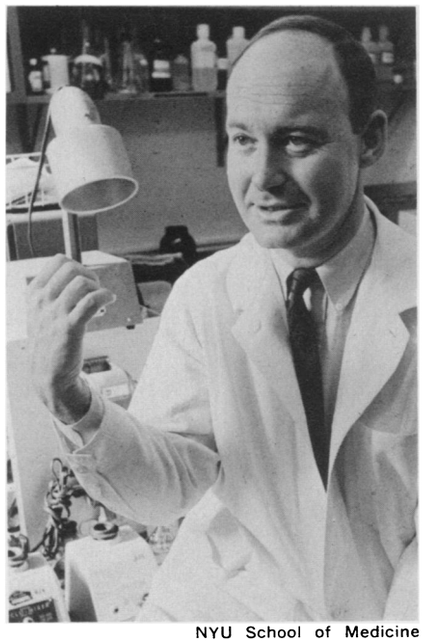
Pioneer 9's sensors also saw 4,000 times more solar cosmic rays than normal. This was confirmed by Pioneer 6 (at the time about 126 million kilometers from the sun), which recorded the greatest number of high-energy particles ever seen. At the peak of the storm, these cosmic rays reached Pioneer 9 in less than one hour, compared with the 33 hours for the solar wind particles. At Pioneer 10 the interplanetary magnetic field was 100 times higher than normal.

"Space is a fantastic plasma laboratory for observing on a huge scale how charged particles and magnetic fields act in a vacuum," Wolfe notes. "We've never been able to observe how these disturbances move out into the interplanetary medium before."

The stormy solar region 331 has now rotated away from the earth, but measurements by the other Pioneers indicate the sun is still spouting out particles and X-rays in massive amounts. Pioneers 6, 7 and 8 will continue to observe the source area, although the amount of data scientists will get from these craft are severely limited due to other demands on the use of the huge space antenna, the 210-foot dish at Goldstone, Calif.

Meanwhile, Pioneer 10, heading for Jupiter, was moving safely through the asteroid belt. In fact, says Wolfe, it has so far seen no significant increase in the number of the small particles one-millionth of a gram or smaller. This week there were indications that the count might be going up a bit. □

Prostaglandin complicity in rheumatoid arthritis



NYU School of Medicine
Prostaglandin-researcher Weissmann.

More than five million Americans, the Arthritis Foundation estimates, are victims of rheumatoid arthritis, a potentially crippling disease characterized by persistent inflammation, usually of the joints. Treatment can help relieve the symptoms of the disease but not cure it. However, scientists are relentlessly closing in in the causes of inflammation, and they anticipate the work will eventually, lead to better drug therapy.

Ordinarily, immune responses are essential to health. Antibodies or other natural body chemicals participate in these reactions. But abnormal immune responses, many researchers believe, are capable of causing tissue inflammation. In other word, normal defense mechanisms of the body turn against the body itself. This autoimmune theory for rheumatoid arthritis is today a predominant one, according to John L. Decker of the National Institute of Arthritis, Metabolism and Digestive Diseases, and president of the American Rheumatism Association.

During the past five years or so, and especially in recent months, prostaglandins have become more and more suspect of triggering inflammation. Prostaglandins are hormone-like substances that act locally in many tissues of the body. A year ago, John Vane, J. Bryan Smith and Anthony Willis of the Royal College of Surgeons in London found that aspirin can prevent laboratory synthesis of prostaglandins (SN: 7/17/71, p. 39). Since then, other researchers have confirmed the discovery in patients. The Sept. 1 NATURE reports, for

Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to *Science News*. www.jstor.org

example, that a dose of only eight aspirin a day temporarily reduced the amount of various prostaglandins in the seminal fluid of young male volunteers. All this research offers a fairly tight explanation for why aspirin can control inflammation in the early stages of arthritis—by inhibiting inflammation-triggering prostaglandins.

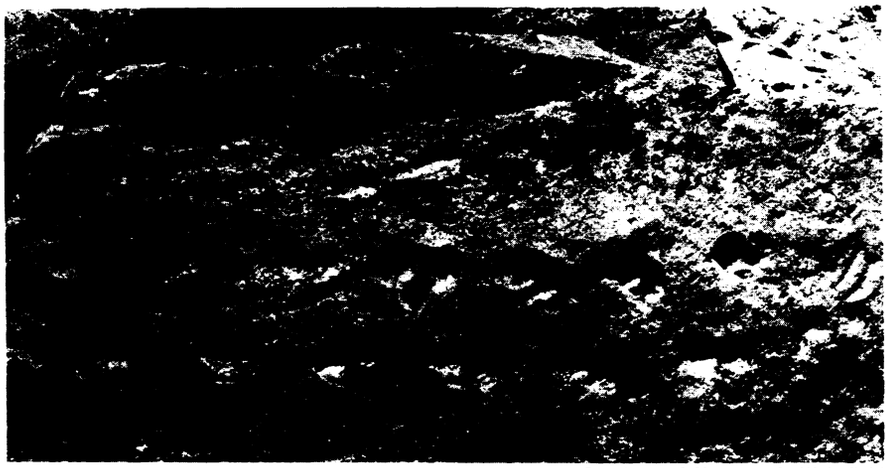
Now, Gerald Weissmann, Robert Zurier, Sylvia Hoffstein and Franco Quagliata of New York University School of Medicine have further evidence for prostaglandins' role in inflammation and arthritis. They have found that prostaglandins, which normally turn on inflammation, can also turn it off.

About a year ago, Quagliata and Zurier reported in NATURE that injecting massive doses of prostaglandins into rats with adjuvant arthritis, an artifically induced condition similar to rheumatoid arthritis, suppressed tissue inflammation and damage. They are now studying the same action in rats whose adrenal glands have been removed, to make sure the inflammation-suppressive action is indeed caused by prostaglandins, and not by adrenal steroid hormones. So far, Zurier told SCIENCE NEWS, they are quite sure prostaglandins, not the steroids, are the suppressors.

The New York University team also has evidence that, when prostaglandins switch off inflammation, they probably do so by turning off the release of certain potent enzymes from white blood cells. Weissmann, Hoffstein and Zurier report in this month's AMERICAN JOURNAL OF PATHOLOGY that they exposed purified human white blood cells to aggregates of suspected inflammation triggers—not the prostaglandins, but antibodies known as immunoglobulin G and rheumatoid factor (found in the tissue of 70 percent of all rheumatoid arthritis patients, although scientists are not sure what it is directed against). As the white blood cells engulfed the antibodies, a normal immune response, they released potent, so-called "lysosomal enzymes." Treating the white blood cells with fairly large concentrations of several kinds of prostaglandins, the researchers found, turned off the release of the inflammation-causing enzymes.

Further questions about prostaglandins' role in inflammation and rheumatoid arthritis still need to be answered. For example, how can prostaglandins that normally turn on inflammation also turn it off? This seeming contradiction, Weissmann says, is probably explained by a rather common biochemical phenomenon known as "negative feedback." That is, whenever certain levels of a chemical are reached in the body, those levels signal the body to turn off production of the chemical until further notice. □

Footprints in the sand(stone)



Courtesy of Norman A. Wakefield

Genoa River trackways: "Remarkably clear" imprints 355 million years old.

About a year ago, two Australian scientists discovered three ancient trackways, or sets of footprints, preserved in sandstone in the Genoa River beds of eastern Victoria. Norman A. Wakefield of Monash Teachers' College and James W. Warren of Monash University kept the discovery to themselves until the trackways could be safely transferred to a museum. Now, Wakefield and Warren have published their analysis of the find in NATURE. The published article, and a communication from Wakefield, clarify and add details to an earlier report (SN: 8/19/72, p. 117), which contained several inaccuracies.

They conclude that the trackways are the oldest known tracks of limbed vertebrates. The tracks, the scientists estimate, are about 355 million years old, about the same age as the oldest known fossils of limbed vertebrates, previously found in Greenland.

One trackway, about 1.1 meters long, is a "remarkably clear" set of 38 impressions. The tracks made by the hind foot are about 3.5 centimeters wide with five toes. One track shows traces of webbing between the toes. The forepaw is smaller and has at least three toes. The researchers estimate that the animal that made the tracks was about 55 centimeters long.

The second trackway is not as clear as the first, but it shows a wavy mark between the left and right foot impressions that was probably made either by a tail or by the animal's underbelly. This animal had a longer stride than the other and the impression of the forefoot is missing in some places. This indicates, say the researchers, that the animal may have been using body and tail undulations to assist in locomotion. The third set of tracks reveals no details of foot structure, but relative placement of the footprints indicates that the animal was 90 centimeters long.

The best-known of the Greenland fossils are of *Ichthyostega*, an amphibian slightly less than a meter long, with a blunt head, stout tail and short limbs. Wakefield says the Genoa River trackways were probably made by amphibians similar in size and general body and foot shape to *Ichthyostega*.

One of the most interesting aspects of the find, say Wakefield and Warren, is the way the toes of the hind foot in the first trackway point outward from the body. In later amphibians, the hind feet are pointed more toward the front. Wakefield predicts that study of these tracks "will throw new light on the early evolution of tetrapod locomotion, for the prints demonstrate a more primitive stage of limb development than has been observed previously in the fossil record." □

The APA gets into population psychology

Psychologists are not trend setters. They, like most scientists, go where the Government money is and attempt to solve problems currently in the public eye. In this manner psychology is becoming more socially active and problem-oriented. One problem that has received a considerable amount of attention in the past five years is population control.

Demographers, sociologists, economists, political scientists, legal scholars and anthropologists have all become interested in the various aspects of population research that fall under their auspices. Similarly, three years ago, the American Psychological Association officially began to look into the psychological ramifications of population control. An APA task force was established to study the possibilities of teaching and training population psychologists and broadening the knowledge of population