physical sciences

A grouping of radio sources

Near the border between the constellations Pegasus and Lacerta is a group of highly disturbed galaxies called Stephan's Quintet. It has been suggested that this group was ejected from the nearby Sb spiral galaxy NGC 7331.

Existing radio maps appeared to support this contention by showing radio-emitting matter extending from NGC 7331 toward Stephan's Quintet. In order to get a better picture of this material Halton Arp of the Hale Observatories made a new radio investigation of the area between the quintet and NGC 7331.

In the June ASTROPHYSICAL JOURNAL LETTERS Arp reports a group of bright radio sources in the space between NGC 7331 and Stephan's Quintet, apparently connected with the large galaxy and the quintet. Galaxies frequently come in groups and clusters, but this is the first time, says Arp, that a group of associated radio sources has been found. The implication, according to Arp, is that the radio sources in the group are somehow related to the quintet and to the process by which the quintet is related to NGC 7331.

Sizes of interstellar masers

Using very long baseline interferometry, radio astronomers have determined the apparent sizes of the interstellar masers—clouds of hydroxyl radicals and water molecules. They range in the tens or hundreds of astronomical units. (One a.u. is the mean distance from the earth to the sun.) Some astronomers doubt that these are the true sizes. They allege that scattering of the radio waves by inhomogeneities in the electron distribution of the clouds of ionized hydrogen in which the masers are embedded could make the masers look larger than they are.

In the June 15 ASTROPHYSICAL JOURNAL LETTERS, Robert W. Boyd and Michael W. Werner of the University of California at Berkeley present a calculation that shows the scattering to be too small to account for the observed sizes. They conclude that the observed sizes are true sizes—10 to 100 a.u. for hydroxyl masers, less than 10 a.u. for water—and that if the masers are indeed stages in stellar evolution, as theorists suppose, the more diffuse hydroxyl clouds represent an earlier stage than the water.

How heavy ions interact with nuclei

Heavy ions are being more and more used as probes in studies of the structure of atomic nuclei. The complexities that may occur when a whole nucleus strikes another can yield information not brought out when the probe is a single particle.

In the June 19 PHYSICAL REVIEW LETTERS a group at Oxford University led by D. K. Scott reports a selectivity in the action of carbon 12 probes of 114 million electron-volts energy when they strike targets of carbon 12, oxygen 16 and calcium 40. The interaction shows a preference for the transfer of one nucleon, a neutron-proton pair or a three-nucleon group from probe to target. In the case of carbon 12 targets the cross section for these transfers came out about 200 times that for transfer of two-proton or two-neutron groups. The Oxford investigators suggest that this selectivity will be useful in checking theories of nuclear structure, which tend to see nuclei as made up of variously constructed subgroups of nucleons.

biological sciences

Precursor of parathyroid hormone isolated

The parathyroid glands, four tiny chemical factories located in the neck, help maintain calcium in the blood and bone and control muscle contraction and nerve impulses. Parathyroid hormone was extracted 45 years ago. Only now has a precursor of that hormone, pro-PTH, been isolated. David Cohn and James Hamilton of the Veterans Administration Hospital in Kansas City reported their achievement last week in Washington at the Fourth International Symposium of Endocrinology. Apparently this is the second time that a hormone precursor has been isolated. The other was proinsulin.

Clinicians have noted in the past few years that parathyroid hormone abnormalities and parathyroid gland cancer are more extensive than they thought. Calcium and parathyroid disorders are also becoming apparent in kidney dialysis patients. Consequently an understanding of how parathyroid is made might lead to better clinical control of oversecretion and malfunction of the parathyroid gland.

Hormone action on prostate gland

Wells Farnsworth, a biochemist at the Buffalo, N.Y., Veterans Administration Hospital, and Maurice Gonder, chief of urology at the hospital, have some evidence for steroid binding and behavior in cells of the prostate gland. This gland contributes some of the fluid contained in semen. In many older men, the prostate becomes enlarged or cancerous and requires surgery.

The Buffalo investigators have found that different androgens (steroids) selectively bind to cells of the prostate. These hormones attach themselves to the cell surface and inner membrane network of the cell. In so doing, they activate an enzyme called ATPase. This enzyme is part of the sodium-potassium pump that lets nutrients into the cell. The binding and activation of ATPase, they have discovered, is also stronger in cells from an enlarged prostate than in cells from a cancerous prostate. "This discovery," Farnsworth reported at the endocrinology meeting, "may provide an early diagnostic tool for determining whether a man has an enlarged or cancerous prostate and the nature of such growth."

Cyclic AMP and vasopressin release

Now that vasopressin, the antidiuretic hormone, can be better detected in the blood (SN: 4/29/72, p. 285), Norman H. Bell, Charles M. Clark Jr. and Gary Robertson of the Indiana University School of Medicine have measured the release of vasopressin into the blood of human subjects when they were injected with dibutyrl cyclic AMP. This compound is a synthetic cousin of the natural secondary hormone messenger, cyclic AMP. Subsequently the Indianapolis endocrinologists found that the hormone glucagon and some neurotransmitters can turn on cyclic AMP in the posterior pituitary tissue of pigs. The posterior pituitary is known to make vasopressin in both animals and man.

Since the synthetic cousin of cyclic AMP can trigger vasopressin release in human subjects, and cyclic AMP can be switched on in the posterior pituitary of pigs, they conclude that cyclic AMP probably turns on vasopressin production in both humans and animals under normal conditions.