life sciences

Gathered at the Federation of American Societies for Experimental Biology in Atlantic City last week

COAGULATION

Aspirin against clotting

Aspirin long has been known to induce a minor degree of stomach bleeding, even in normal individuals taking as few as two or four tablets in a day. Experiments by three New York investigators suggest that low doses may have value in preventing blood clots.

Dr. Harvey Weiss of Roosevelt Hospital, with Drs. Callisto Danese and Choudary Voleti of the Mount Sinai School of Medicine, examined the biochemical relationship between aspirin and blood.

Aspirin, Dr. Weiss found, prevents the release of a compound in platelets called adenosine diphosphate (ADP). ADP release, he suggests, may be the mechanism by which platelets gain a sticky property, leading to accumulation and clot formation.

In experiments with dogs whose vessel walls were deliberately injured to simulate a diseased artery, the scientists showed that 43 percent of the animals treated with a placebo developed massive arterial blood clots, while clotting occurred in only about 10 percent of dogs treated with aspirin after vessel injury. In addition, the clots that did appear in the aspirin-treated dogs were considerably smaller; in no case was there total arterial blockage.

DERMATOLOGY

Eczema substance isolated

Eczema, which causes redness, itching, small blisters and a discharge of a drying fluid from the skin, affects several million individuals in the United States.

Dr. Jorgen Sondergaard, a Danish scientist on leave at Stanford University School of Medicine, with Dr. Malcolm W. Greaves of Newcastle upon Tyne, England, reports new understanding of the allergic disease. They have isolated a compound that is released from the skin of eczema patients but is absent in normal volunteers and in individuals with skin allergies from insect bites or drugs. The substance, tentatively identified as a smooth muscle-contracting agent, is a fatty acid.

The agent, they speculate, may be chemically related to prostaglandins, compounds that occur in a variety of forms in most body tissues and influence blood vessel constriction in skin.

BIOCHEMISTRY

Enzyme enhancer for L-dopa

Though L-dopa, in recent years, has become one of the most promising drugs for treatment of Parkinson's disease (SN: 1/17, p. 70), its use is accompanied by side effects, including vomiting, because it must be given in extremely large doses—up to eight grams a day.

Dr. Curt C. Porter of the Merck Institute for Therapeutic Research in West Point, Pa., reports that an enzyme-inhibiting agent called HMD (Alpha-Hydrazine-Alpha-Methyl-Beta-3, 4, dihydroxyphenyl propionic acid) permits a 75 to 80 percent reduction in L-dopa dosage without impairing its effectiveness. HMD inhibits the activity of an enzyme called dopa decarboxylase. The enzyme converts dopa to dopamine in the brain where it is active. Dopamine itself cannot cross the blood-brain barrier and enter the brain.

The difficulty scientists have encountered in using L-dopa, and which accounts for the need for high doses, lies in the fact that the dopa decarboxylase enzyme is present not only in the brain but in other body tissues as well.

Hence, it acts on L-dopa throughout the system, converting large quantities before they ever reach the brain. The inhibiting compound Dr. Porter has studied largely blocks the conversion of unaltered L-dopa in body tissues, thereby assuring that it will reach the brain where it is needed in parkinsonism.

ENDOCRINOLOGY

Agents inhibit calcium release

From studies of a variety of hormones that influence the body's use of calcium, a team of Boston scientists has discovered a new class of agents that may slow bone destruction. In studies with rats, they find that five derivatives of a parent compound called thiophene reduce the rate at which calcium is biochemically released from bone into the bloodstream.

Drs. Victor S. Fang, Armen Tashjian Jr. and Paul Goldhaber of the Harvard School of Dental Medicine report that thiophenes are compounds with a chemically simple five-ring structure that may be prototypes for drugs. Administered orally to rats, the thiophenes reduce blood calcium levels within hours, with no apparent toxicity.

PHARMACOLOGY

Explaining hallucinogens

Mescaline, LSD and psilocin are drugs that have at least two things in common. All produce hallucinations and after repeated use of any of them a person needs increasingly high doses to get the same effect.

A third common characteristic of these agents, one that may explain their mechanism of action, is reported by Drs. Sungzong Kang and Jack Peter Green of the Mount Sinai School of Medicine in New York.

Each of the three drugs is markedly different in chemical structure, the scientists point out. Yet experiments show that all three hallucinogens share similar electric characteristics. They applied quantum mechanics to an analysis of their electronic structures, and found that energy levels in the highest occupied molecular orbit are alike. This would account for their ready ability to interact with other substances.

Studies of the molecular geometry of the three drugs revealed that the important atoms of each have similar spatial relationships indicating that they are more alike than their diverse chemical structures would indicate. "This implies," Dr. Green says, "that all three may act at the same receptor site in the brain."