

## PHYSICS

# New Magnetic Field Effect

Find that small particles, such as cells and bacteria, move in a magnetic field traversed by an electric current. Effect is called "electromagnetokinetic" phenomenon.

► A NEW way of separating small particles, such as cells, bacteria or possibly viruses, has been discovered by Dr. Alexander Kolin, University of Chicago physicist, as the result of finding a hitherto unobserved phenomenon of magnetic fields.

This is expected to be of major significance for biology and medicine in the study of living tissues and isolated living cells. The effect is called by Dr. Kolin the "electromagnetokinetic" phenomenon.

What Dr. Kolin found is this:

Particles which are electrically neutral migrate, or move, in a magnetic field traversed by an electric current. The migration is perpendicular to the current and to the homogeneous magnetic field that is maintained at right angles to the current.

The particles can be made to move in one direction or the other or to stand still, depending upon the relation of their electrical conductivity to the conducting liquid in which they are placed.

If the electrical conductivity of the particles exceeds the surrounding fluid, they migrate in the direction of the force exerted in the magnetic field upon the current. Particles of lesser conductivity than the fluid migrate in the opposite direction. If the electrical conductivity is the same for particle and environment, no force is exerted.

The force of gravity as well as the force of buoyancy exerted upon a suspended body, like an air bubble in conducting water, can be neutralized.

Important uses of the new phenomenon are expected.

It can be used for separating particles of the same density with much the same result that gravitational or centrifugal forces are used in the ultracentrifuge to separate particles of different density. This will open new possibilities in many fields of research, medical and otherwise. Such particles of nearly equal density but of distinctly different electrical conductivity could be cells of different tissues, algae, bacteria and possibly viruses.

Different shaped particles, such as spherules, rodlets, and platelets, may be separated even when their densities, volumes and electrical conductivities are the same.

Irregular bodies and microscopic particles may have their electrical conductivities measured by finding the conductivity of a solution in which they experience no electromagnetic force. This means that living cells and various tissues can now have their conductivities measured.

Undesired electrochemical effects can be

avoided by using high frequency alternating currents in phase with an alternating magnetic field. This makes it possible to use the method on delicate and living substances without stimulating them and injuring them.

This use of alternating fields is similar to the use of alternating current in diathermy to apply electrical energy to the human body without subjecting it to electrical injury.

Some of the mysteries of life within living matter may be explained by the newly discovered phenomenon.

Some of the unexplained happenings in the ocean, such as electric currents set up by tides and effects of the earth's magnetic field, may also be explained.

To demonstrate the migration effect, Dr. Kolin suspended mustard seeds and whitefish eggs in a concentrated solution of ordinary sugar, or sucrose, made conductive by a small amount of an electrolyte. With the

current and magnetic field used, the eggs and the seeds moved in opposite directions at the speed of about half an inch a second, one centimeter per second.

The direction of migration of the fish eggs can be reversed by reversing the electric current of the magnetic field, and the migration direction coincides with the direction of the force exerted upon the current.

For uncharged particles in magnetic fields, the Kolin effect is similar to electrophoresis, which is the migration of charged particles in electrical fields.

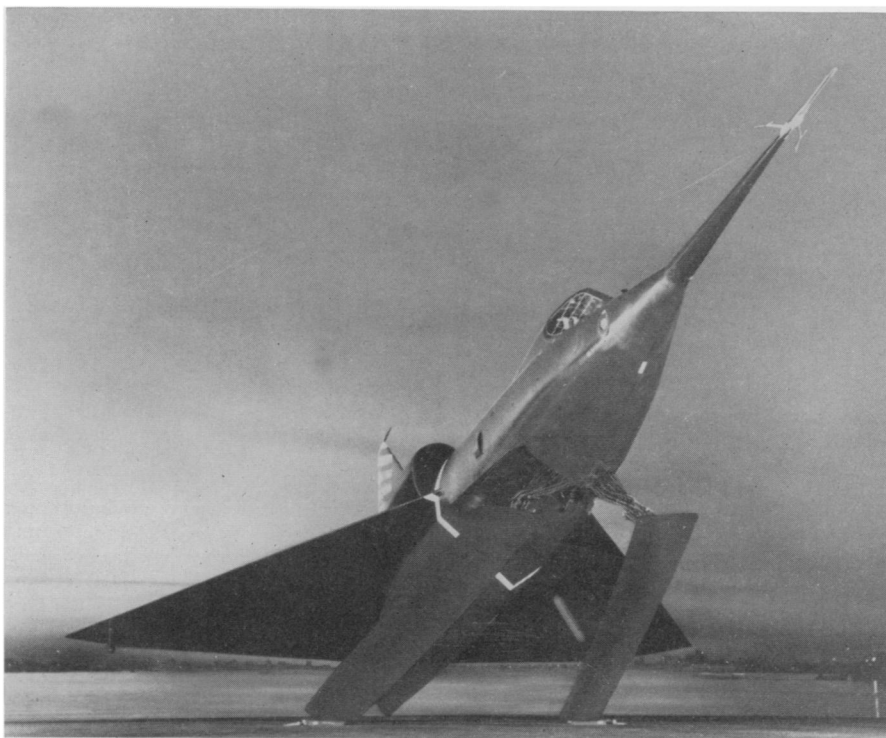
Dr. Kolin made his discovery as the result of trying out all possible methods of getting at the contents of cells without breaking their walls.

As Dr. Kolin developed the facts about his phenomenon, he was surprised to find that no one had described it before. He feels there is no reason that it could not have been described a hundred years ago, but no one has before.

Dr. Kolin is 42 years old. Born in Odessa, Russia, he is a naturalized U. S. citizen and has been in this country since 1934, after he received his Ph.D. in physics at Prague. He has been on the faculty of the University of Chicago since 1946.

His discovery and its possibilities are described in *Science* (Feb. 6). His work was supported by the Abbott Memorial Fund of the University of Chicago.

Science News Letter, February 21, 1953



**SEA-DART ON SHORE**—This picture of the Navy's triangle-shaped experimental jet fighter, the Sea-Dart, is the first showing it on shore. The Sea-Dart, built by Consolidated Vultee Aircraft Corp., is the first combat-type airplane in this country employing hydro-skis for improved rough water landing and take-off operations.