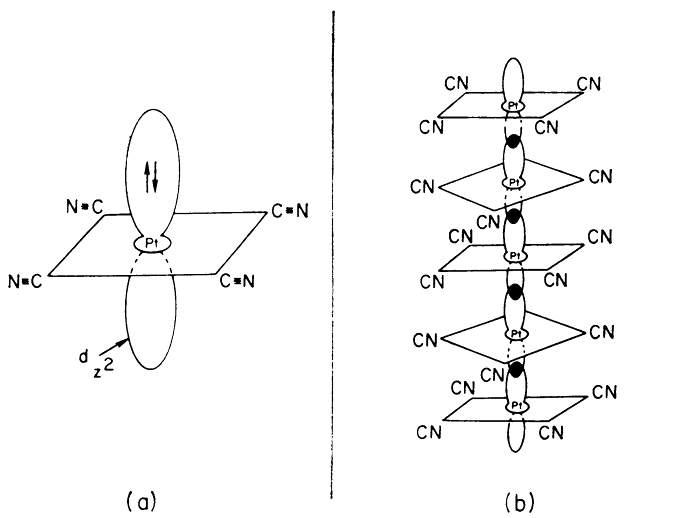
the genetic contents of the pulverized chick nucleus and have been able to absorb bits of it. With this new information they are now able to synthesize the IAP and are, in effect, whole cells directly descended from defective cells.

Previous experiments along these lines have not been successful because the introduction of a foreign body into a cell triggers a specific and highly complicated defense mechanism which causes rejection of the foreign body. Use of the chromosome pulverization method apparently enables the cell to pick up such extremely small amounts of the needed genetic material that the defense mechanism is not put into action. Overcoming this antigen-specifying mechanism is the experiment's outstanding engineering achievement.

The experiments were conducted in specific tissue cultures that enabled the researchers to study the growth and reproduction of the cells and to monitor the presence of chick genetic material. The next step will be to find out if the same genetic transfer is possible in cells other than chick and mouse. If so, the correction of genetic defects in humans may actually be possible in the future. "Approaches to this problem are, however," Dr. Harris and his colleagues report, "hampered by a number of difficulties." If and when these problems are overcome it would be possible to take defective cells from a patient, treat them and then resupply the patient with his own corrected cells. □

SUPERCONDUCTIVITY

New heat in a chilly argument



Structure of the one-dimensional conductor, potassium tetracyano platinate: In the center of each plane is a platinum atom.

Johns Hopkins

Finding a substance that would be an electrical superconductor at room temperature is a dream that has haunted students of the solid state since superconductivity was discovered 60 years ago. Superconductivity is the ability to pass electric currents without resistance. It appears in a number of metals at temperatures near absolute zero, but in none so far known does the property persist at temperatures above 21 degrees K.

If superconductivity could be found at room temperature, many power-saving technological innovations might follow.

The most widely accepted theory of superconductivity sees no bar in principle to high-temperature superconductors. All that is needed is a molecule of the proper structure, and several investigators, most notably Dr. W. A. Little of Stanford University, have been trying to make one (SN: 2/15/69, p. 169).

Other experts in the field deride the idea. Most outspoken of these is Dr. Bernd T. Matthias of the University of California at San Diego, who has repeatedly said that searches for high-temperature superconductors are futile and that the theory on which they are based is erroneous.

Proponents of high-temperature superconductivity now have a new datum that adds to their hope of winning the argument. It is the discovery, by Dr. Jerome H. Perlstein and Michael J. Minot of Johns Hopkins University, that the compound potassium tetracyano platinate with bromine added is a one-dimensional electric conductor, a basic ingredient in Dr. Little's prescription for building a high-temperature superconductor.

Most ordinary electrical conductors are three-dimensional: conduction electrons will move through them in any direction. But in potassium tetracyano platinate currents can propagate only along the chains formed by the platinum atoms. The platinum chains are surrounded by carbon-nitrogen groups in such a way that they are insulated from each other, and currents cannot propagate in oblique directions.

The average conductivity that Minot and Dr. Perlstein find for potassium tetracyano platinate is 5×10^{-7} mho per centimeter. This is about 1,000 to 10,000 times smaller than the conductivity of common electrical materials like copper or silver, but it is still a respectable conductivity and the first time, says Dr. Perlstein, that a reasonably high one has been found in a substance with one-dimensional properties.

Chains like the platinum ones in potassium tetracyano platinate could form the spine for a superconducting macromolecule based on Dr. Little's prescription, says Dr. Perlstein. When one has such a spine, the next step is to surround it with groups of atoms that can be electrically polarized, and if these can be properly put onto the spine, superconductivity should result.

The essence of superconductivity is that the conduction electrons bind themselves together in pairs. Pairs are able to proceed without feeling the resistance that single electrons feel. But electrons naturally repel each other, so some intermediary is necessary to bind them together.

In low-temperature superconductors, theorists reason, the chilling permits vibrations of the lattice of the metal crystal, called phonons, to perform the intermediary function, altering the balance of forces between electrons so that a net attraction exists. In the high-temperature case, the polarized atom groups surrounding the spine would do the job: An ordinary current of single electrons running along the spine would polarize the surrounding groups. The polarization would attract electrons and bind them to each other, and the current would become a resistanceless supercurrent.

The carbon-nitrogen groups of potassium tetracyano platinate are not properly polarizable, and the substance is an ordinary conductor, not a superconductor. But, says Dr. Perlstein, "The initial barrier that had to be overcome was making [an electrically] one-dimensional molecule." Now that this has been done, experiments can go to attempts to replace the carbon-nitrogen groups with others more likely to produce superconductivity.

The way to go is not very well mapped. "The theoretical stuff on this is pretty much in the dark," says Dr. Perlstein. Experimenters don't know exactly what kind of polarization of side groups will do the trick. Dr. Perlstein and Minot are going to try some sulfur ligands that look promising. If these don't work they will go on to something else. □