gion. For the newer work, Buchanan and his colleagues used such a messenger.

All three groups now have evidence from peptide mapping that a 25,000-dalton protein is contained within the 60,000-dalton protein. Whether the same is true for the 17,000-dalton molecule is still unclear. And, at the present time, no one knows which of these molecules is active or what they do. The large protein may be an inactive precursor of the smaller molecules. Or the latter might be simply breakdown products of the former. Or all might have some kind of activity. An intense effort to resolve these issues and determine how the *src* gene product transforms cells is now under way.

The function of the *src* gene and its products may not be limited just to transformed cells, however. Normal cells contain DNA sequences related to the RNA sequence of this gene, according to Harold Varmus, J. Michael Bishop, and Deborah Spector of the University of California at San Francisco, and Dominique Stehelin, now at the Pasteur Institute in Lille, France. They find that cells from all the vertebrate species they have examined—ranging from fish to primates—have one or at most a very few DNA sequences related to the *src* gene.

Their data indicate that the *src*-related sequence of the chicken is only 3 to 4 percent different from that of the ASV gene.

Speaking of Science

Chemicals: How Many Are There?

Like it or not, the world around us is filled with chemicals. The clothes we wear, the foods we eat, the magazines we read, and virtually all of the other things that nurture our civilization are made possible by the use of chemicals. Recognition of these facts, and of some of the potential dangers of chemicals, often prompts the question How many chemicals are there? A definitive answer to that question has proved elusive, but one measure of the answer is provided by the American Chemical Society's Chemical Abstracts Service (CAS). As of November 1977, CAS's unique computer registry of chemicals contained 4,039,907 distinct entities. The number of chemicals in the register, moreover, has been growing at an average rate of about 6000 per week.

CAS began the computer registry in 1965 to assist in the indexing of chemical substances reported in the scientific literature. The system identifies chemicals on the basis of an unambiguous computer-language description of their composition and molecular structure and automatically assigns a permanent identifying number to each unique substance. The registry contains all compounds that have been mentioned in the literature since 1965.

The system is not set up to provide a detailed breakdown of different classes of chemicals. Some broad generalizations can be made, though. About 96 percent of the chemicals, for example, contain carbon. The average compound in the registry, if it is possible to define such a thing as an average compound, contains 43 atoms, 22 of which are hydrogen. The fictitious average compound also contains one and a half ring systems with eight atoms per ring.

About 3.4 million of the chemicals are organic or inorganic chemicals whose structures are fully defined. Some 3 million of these contain at least one ring system. Another 258,000 entities are coordination compounds, which require a somewhat different registration procedure. About 59,000 are organic compounds whose structures are not completely defined; these generally are compounds in which the exact location of a substituent or a double bond or the site of an esterification is uncertain. About 120,000 entries are listed only by name or molecular formula; these are specifically identified substances for which not enough is known or has been disclosed about structure to permit machine structure registration. The registry also lists 72,000 alloys, 120,000 polymers, and 10,000 mixtures with specific names.

The list contains some apparent duplication in that stereoisomers are listed individually. There are, for example, four listings for aspartic acid: D-aspartic acid, L-aspartic acid, DL-aspartic acid, and aspartic acid of unspecified stereochemistry. Since each of these has its own biological characteristics, however, they can justifiably be considered distinct entities.

The vast majority of chemicals in the registry are esoteric materials that have been isolated from natural products or synthesized for research purposes. A more interesting problem, then, might be to define the number of chemicals that are in everyday use. That problem is much more difficult, but at least a partial answer may soon be available. As part of the Toxic Substances Control Act, the Environmental Protection Agency (EPA) has been charged with maintaining an inventory of chemical substances manufactured, imported, or processed in the United States for commercial purposes. Because there are so many different names for many of the chemicals used in industry, EPA has contracted with CAS to process reports submitted by manufacturers, determine the precise identity of the reported chemicals, and create and maintain a computer file on the chemicals and their manufacturers.

To initiate the project, CAS has submitted to EPA a preliminary list of some 33,000 chemicals that are thought to be in common use. The complexity of the registration problem is illustrated by the fact that CAS has already found in its files more than 183,000 different names for those chemicals. Current estimates from EPA, moreover, indicate that there may be as many as 50,000 chemicals in everyday use, not including pesticides, pharmaceuticals, and food additives. EPA estimates that there may be as many as 1500 different active ingredients in pesticides. The Food and Drug Administration estimates that there are about 4000 active ingredients in drugs and about 2000 other compounds used as excipients to promote stability, cut down on growth of bacteria, and so forth. FDA also estimates that there are about 2500 additives used for nutritional value and flavoring and 3000 chemicals used to promote product life. The best estimate thus is that there are about 63,000 chemicals in common use. Small wonder then that determination of the safety of all commonly used chemicals is a massive project that may never be completely finished.

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