

Germs Leave 'Prints'

➤ **DISEASE - CAUSING** organisms may soon be identified by the "fingerprints" they leave behind, a team of scientists at General Electric's Electronics Laboratory, Syracuse, N.Y., and Cornell University, Ithaca, N.Y., believe.

The scientists examined 32 strains of bacteria and measured the different chemical molecules excreted in the life process. Each strain left a distinct pattern of "fingerprints" on a standard laboratory chromatogram, enabling them to tell one species from another and to identify different strains within a species.

The technique, which takes from 10 to 20 minutes once the sample is ready, was devised by Dr. Martin Alexander, a microbiologist at Cornell, and John R. Gould, consulting chemist at the Electronics Laboratory.

Dr. Robert T. O'Brien, consulting microbiologist at the Laboratory, and Dr. Yigal Henis of the Hebrew University, Rehovot, Israel, conducted research in specific areas of the project.

"Detection and identification that now takes days or weeks by classical methods could be done in hours," Mr. Gould said. "For example, the diagnosis of pneumonia, which may require weeks, could be reduced to a matter of days or hours. The bacteria causing tuberculosis or anthrax can only be recognized as distinct from closely related species by time-consuming operations."

Dr. Paul Bunn, professor of medicine at the Upstate Medical Center, Syracuse, said the technique would be invaluable in tracking down infection in a hospital. A doctor would be able to rapidly identify and treat a disease-causing bug.

GE scientists believe the technique may lead to a reclassification of bacteria by metabolism. For the first time, scientists have a hint as to what is going on inside the microorganism.

The technique could also be coupled to an automatic computer identification system and applied to air and water pollution monitoring equipment.

A standard laboratory chromatograph is used to separate and analyze the metabolic products of each strain.

As the molecules pass through the material in the instrument, they are monitored as to quantity and transit time, and recorded as a series of peaks on a chromatogram.

The "fingerprint" consists of a series of letters, each letter standing for a

metabolic product. "A" stands for ethanol, "B" for diacetyl, "H" for acetic and so forth. The pattern for one strain of *Bacillus licheniformis*, for example, is "FKNEC, abdgih."

The order of the letters is determined by the quantity of each chemical, which varies with the different strains. A small letter indicates only trace amounts of that chemical.

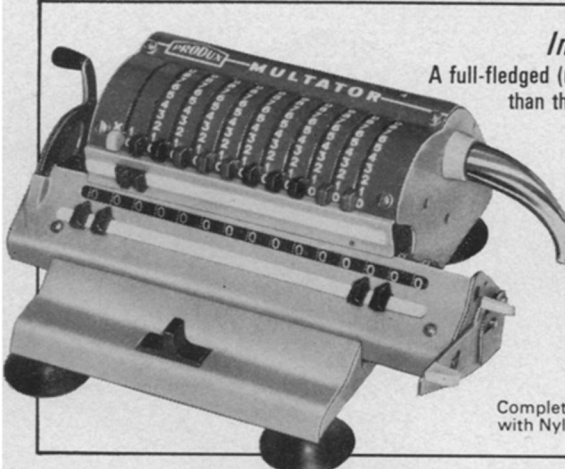
Distinct "fingerprints" were obtained for 32 samples, including 29 strains of

six species of *Bacillus* and individual strains of *Escherichia coli*, *Aerobacter aerogenes* and *Pseudomonas aeruginosa*. The study was sponsored by the U.S. Air Force Office of Scientific Research.

Charles G. Schnorr, manager of the chemical and biological section of the Electronics Laboratory, told SCIENCE SERVICE that the next step is to experiment with mixed strains.

• Science News, 90:34 July 16, 1966

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