

NEW SCOPE IN BLOOD FLOW STUDIES

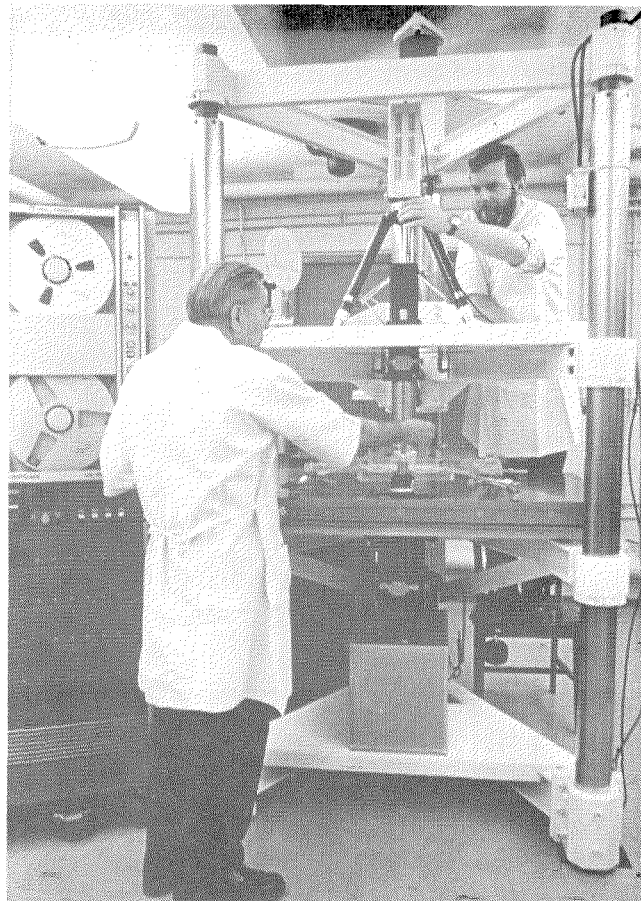
Caltech has, for nine years, had a research group studying the flow of blood in living and artificial systems. The work has been done under the direction of Harold Wayland, professor of engineering science, in collaboration with Wallace Frasher, M.D., of USC's medical school, who is also a senior research fellow in engineering at Caltech. The two men have now designed an experimental operating table that greatly expands the scope of their investigations.

The new instrument, which is called a Precision Animal Table and Intravital Microscope, is basically a 2½- x 4-foot table with attached microscopes, television equipment, high-powered lights, a life-support system, and measuring instruments. It took a year to design, six months to build in Caltech's engineering shops, and cost \$20,000. Although it has been installed in the Thomas Engineering Laboratory for only a few weeks, other research institutes have already expressed interest in borrowing the design.

The new equipment has several features that are a considerable improvement over the ordinary microscope table previously used by the research group to examine blood flow in the tissue of experimental animals.

First, it has a high degree of stability that allows the observers to make precision measurements of flow rates in vessels as small as 5- to 10-micron capillaries.

Second, it permits the researchers to switch the area of their observation from one part of a subject to another because the ancillary equipment can be moved along with the animal without disturbing the normal functioning of the blood flow or of the optical equipment. The complete life-support equipment and measuring instruments, which must be rigidly attached to the animal, can be moved as a unit.



Harold Wayland focuses the microscope and Peter Gaehtgens adjusts the TV camera on the Precision Animal Table.

And third, the new table can accommodate the handling of both small and relatively large animals—up to the size of a mini-pig (250 lbs.).

The most significant advantage of the new equipment, however, is that it allows the research team to examine a much larger area of tissue than they could before. With the old-style table they could look at only one vessel at a time. Now they can explore a microbed (network) several millimeters square of associated blood vessels as large as 100 microns. In this way they can study the overall flow patterns of neighboring vessels and determine their relationship to one another.

The current research project is being carried on by Peter Gaehtgens, M.D., research fellow in engineering science at Caltech, who is exploring the distribution of blood flow in intestinal microbeds. The new equipment permits him to do careful quantitative study (how much, how fast, and how distributed) of blood flow.

The design and production of the table was a joint venture of the Institute and the L.A. County Heart Association-USC cardiovascular research laboratory, and was largely financed by the Alfred P. Sloan Foundation. The research is supported by a National Institutes of Health grant.