

not prove it causes breast cancer, it does provide scientists with needed insights and support for ideas.

The isolation technique itself may be one of the most valuable aspects of Dr. Todaro's work. Many virus-screening methods rely on biological and immunological tests geared to the search for a particular virus. The method Dr. Todaro applied may have more general use.

"It seems," he says, "to have general applicability in searching for occult, nonlethal viruses." Far less expensive and less time-consuming than electron microscopy, it also offers a potential advantage over that technique, at least for initial virus searches. Once a virus candidate is uncovered, its identity could then be confirmed subsequently by electron microscopy.

In addition, the striking likeness between the human breast tumor virus and the Bittner virus suggests that viruses associated with human cancers are as specific as those that cause animal tumors. The Bittner virus produces mammary tumors in some mice, presumably those hormonally or genetically susceptible to its effects. And it causes only breast tumors.

The discovery also has clinical implications. Experience with the Bittner mouse virus, which has been well studied and characterized, indicates that the presence of a virus may be a warning that breast tumors may develop.

A simple antibody-antigen screening technique for the presence of the virus could be an outgrowth of its isolation, Dr. Todaro suggests. An antibody to the virus or antigen would be developed in laboratory procedures. Subsequently, human sera would be mixed with those antibodies. Presence of the virus would manifest itself if a reaction occurred.

It also raises some concern about the safety of women whose milk contains this virus nursing their babies. Mouse experiments show that the virus can be transmitted from mother to young, ultimately leading to tumors in the offspring. Says Dr. Moore, "There is as yet no real reason for women not to nurse their babies, but a similar mechanism of transmission in man is a distinct possibility."

It is likely that additional virus-search projects will be launched in the wake of the breast tumor virus isolation. Both Dr. Todaro and his colleagues and Dr. Moore are participants in the Special Virus Cancer Program, a top priority \$30-million-a-year activity at the National Cancer Institute. It constitutes something of a crash program in the virus-cancer area and is specifically designed to coordinate and pass on leads from one investigator to another. □

ON THE PROWL

Ph.D.'s in high schools

In most European countries teachers in secondary schools usually have doctoral degrees in their academic specialties. In the United States this has not been the case; in fact in some quarters there is even some prejudice against having people with too many degrees teaching in high school.

The beginning of a change in the American custom may be under way thanks to the current slowdown in employment for scientists, with physicists in the vanguard. Concerned because many newly graduated Ph.D.'s were having trouble finding positions, two physics professors at the University of Texas in Austin, Drs. Robert Beck Clark and F. W. de Wette, decided to see what could be done about placing physics Ph.D.'s as high school teachers.

They discovered that Texas was a good place to begin, because certification is easier to obtain there than in many other places. In Texas a school supervisor can get a temporary emergency certificate for a person who does not have the required education courses by stating that an emergency exists.

When such people come to get permanent teaching certificates, a law that Dr. Clark describes as a "very progressive piece of legislation" allows them to go before a board of three university professors and have a training course designed to meet their needs. Many of the requirements can be satisfied by examination.

Drs. Clark and de Wette circularized school administrators in Texas to see how they would respond to the idea of having Ph.D. physicists in their classrooms. Some were willing to try, but, says Dr. Clark, "a lot of other people were very frightened."

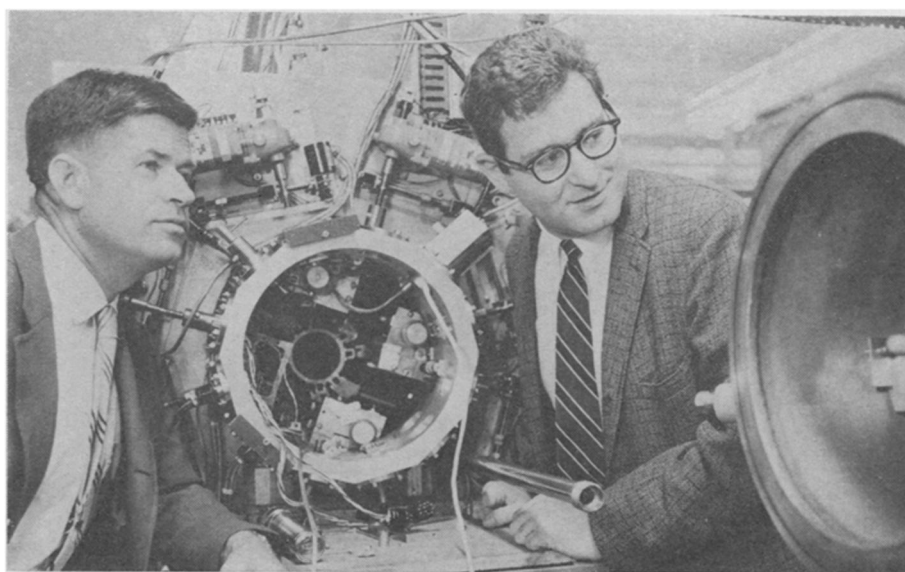
Armed with some definite openings, Drs. Clark and de Wette then went looking for physicists to fill them. They got many more applicants than jobs.

One difficulty in keeping Ph.D.'s happy as high school teachers is that high schools give no opportunity for research. Drs. Clark and de Wette propose that this can be solved by offering teachers adjunct positions in university or industrial research groups. They know of laboratories, they say, where research groups have wanted to have someone working with them, but did not have the money for additional faculty or staff salaries. In such cases, says Dr. Clark, the lab could offer adjunct appointments without salary to Ph.D. high school teachers.

So far no Ph.D. physicists have been hired by Texas high schools, but Dr. Clark points out that the schools customarily do not make their final hiring decisions until late in the summer. Dr. Clark hopes that if a few physicists can be hired this year, and if they perform well, they may convert the skeptics, and the program will really roll in future years.

He does not envision a flood of Ph.D.'s swamping the high schools. "There are not many with the right personality for secondary teaching," he says, and he estimates that a few hundred high school positions in the country may eventually be filled by Ph.D.'s.

Drs. Clark and de Wette hope that the idea will spread. So far they have had inquiries about what they are doing from physicists in Colorado, Utah, California and Ohio. "If we have made a contribution," says Dr. Clark, "it is that we have softened the system, and people are now thinking." □



Frank Armstrong

De Wette and Clark: Finding jobs for Ph.D. physicists in Texas high schools.