

In his essay on jobs, training and welfare, James L. Sundquist, a former deputy under secretary of agriculture now at Brookings, accuses the Johnson Administration of "scrupulously refraining from even hinting at the ultimate cost" of its Great Society social welfare programs.

It is time to end the secrecy, says Sundquist, and lay out the long-range budget choices, "so that the great debate can begin."

Brookings authors who deal with the subject unanimously condemn the current welfare program for its inequities and destructive policies. Administered through states, the welfare system provides grossly different payment schedules in different parts of the country, many far below subsistence levels. While a family in a Southern state receives \$35 a month, the same family in New York City would get \$220. More than half the 34 million people in poverty receive no welfare at all. Welfare policies, as practiced in all but 21 states, foster desertion by unemployed fathers, destroy incentives to work and encourage rapid migration from Southern rural areas to overcrowded Northern cities.

"Reform of this insane piece of social engineering has become a first order of business on the national agenda," states Yale economist James Tobin.

Nationalizing and upgrading welfare systems is an alternative; instituting a negative income tax is another. Either choice would cost roughly the same, says Schultze: from \$5 billion to \$50 billion, depending on the level of income guaranteed and the rate of taxation people pay as they earn their own money (SN: 11/16, p. 497).

At the moment, Negroes are leaving the South at the rate of 100,000 a year, increasing metropolitan populations by 3.1 percent a year. This emigration plus natural increase will create problems in the cities for years to come, says Dr. Tobin.

To attack the hard-core unemployed problem, Dr. Sundquist believes a public works program is essential, along with energetic job training programs, locally based and federally assisted. If private employment expands, the public jobs can be easily retrenched, he says, but it is wishful thinking to believe that industry alone can solve the job training problem.

Neither will black capitalism provide an answer. Negro entrepreneurship should be encouraged, Dr. Sundquist adds, but to suggest that it can provide more than a token number of jobs for the hard-core is "pure romanticism." The black market is simply not big enough. Black capitalism was a theme of the Nixon presidential campaign. ◇

## FERTILIZATION

### Mice in a test tube

For all scientists know about animal reproduction, and for all they can do to control it, the process of mammalian fertilization remains an enigma. Unable to get mammalian eggs and sperm to mate in a test tube, researchers have been able only to speculate about what takes place when a sperm fertilizes an egg in the uterus.

Now a Massachusetts researcher reports the first case of partial test tube fertilization of rat germ cells, and a Welsh scientist working in Australia announces the first true test tube fertilization of mouse eggs.

According to Dr. David G. Whittingham of the University of Sydney, there is no basic difference between human and mouse eggs. Though few American workers in the field will say so directly, Dr. Whittingham's work opens the door to fertilization of human eggs in the test tube.

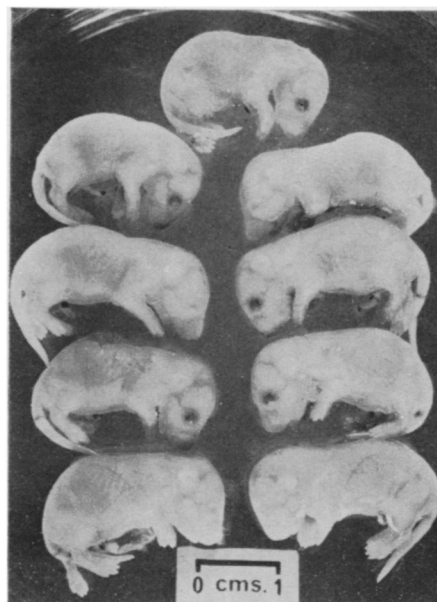
To fundamental research it means new and more relevant studies of the process of fertilization, the uterine environment, the growth of embryos and the possibility of altering them at any point.

The major stumbling block to achieving test tube fertilization has been persuading the sperm to penetrate the eggs. Sperm taken directly from the male and mixed with eggs in a test tube are impotent. In fact, they may be impotent for the first few hours even in natural mating. The work of Dr. Whittingham, and that of Dr. M. C. Chang of the Worcester Foundation for Experimental Biology, Shrewsbury, Mass., who reported the rat studies, lends considerable support to the capacitation theory. That says some factor in the uterus is necessary to activate the sperm.

Dr. Whittingham took eggs from unbred female mice 14 hours after injecting them with hormones that induce ovulation. He placed them on a watch-glass in a growth medium and covered it with oil. Then sperm were collected from the uterus of a female that had been mated to a fertile male two hours earlier. The capacitated sperm cells were introduced to the eggs, placed under the oil cover through a glass pipette, and the mixture was incubated for four to five hours at 99 degrees F.

In 7 experiments 10 to 40 percent of the eggs were fertilized and cleaved or divided into two cells, which were placed in the womb of a third female, made physiologically ready for the fertilized eggs by mating with a sterile male. Nine fetuses developed and were removed from the womb on the 17th day.

Using methods similar to Dr. Whit-



Whittingham

*Mouse fetuses fertilized in test tube.*



Chang

*Sperm (arrow) penetrates rat egg.*

tingham's, Dr. Chang and his co-workers failed to recover a single fertilized egg in 844 tries. Success came when they added to their experimental medium an enzyme that dissolves the membrane envelope surrounding the eggs. Thereafter, fertilization took place, but because eggs cannot survive without that envelope, no baby rats developed.

Creating conditions favorable to fertilization will continue to be a problem, scientists expect, because individual techniques are required for each species.

And biologists still have a long way to go before creating an animal that has been grown, as well as fertilized, in a test tube. The success with mice, and previous partial success with hamsters, shows that the fertilized eggs must be implanted in a foster mother for nourishment after only a few cell divisions. This will continue to be the case until researchers create an artificial womb.