Frank Johnston/Washington Post

Ford and Pauling: "Nourish that spirit."

America. Today more than ever we need to nourish that spirit and to do it in every facet of American life."

Ford noted that changing priorities have resulted in funds for energy research increasing at a rate of 21 percent a year; environmental research, 17 percent a year. But he emphasized that the commitment to basic research has not diminished, with funds for civilian R&D due to increase 12 percent to $7.3 billion in fiscal 1976.

"Our nation's future and that of the world depends on the creativity and genius of people such as these today," Ford said. After his remarks, read from note cards, Ford greeted each recipient and handed him his medal. The National Medal of Science is the Government's highest award for scientific achievement.

In a luncheon for the scientists and guests at the State Department immediately afterward, Rockefeller referred to the recipients as "outstanding heroes in the fields of science and engineering" and said the Administration has "a deep respect for science and the scientific mind."

Rockefeller said he and Ford were confidently looking forward to favorable Congressional action on the bill to establish an Office of Science and Technology Policy in the White House. The bill is now in conference. Rockefeller said Ford "is tremendously excited" about the bill "and feels that this has the highest possible priority."

Rockefeller drew warm applause when he noted that he had voluntarily spoken on behalf of the bill at committee hearings this year. "It was the first time in the history of the United States that a Vice President has testified before a Congressional committee—and it was in the interest of science."

Those receiving the National Medal of Science were Britton Chance, Erwin Chargaff, James V. Neel, James A. Shannon, Rudolf Kompfner, Ralph B. Peck, Abel Wolman, Kurt Gödel, Nicolaas Bloembergen, Paul Flory, William A. Fowler, Linus Pauling and Kenneth S. Pitzer. □

Arthropod academy: Flies learn maze

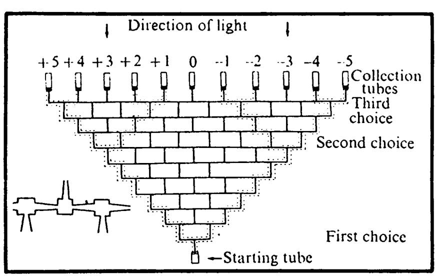
The salivary chromosomes of *Drosophila melanogaster* are among the best-charted territories in the atlas of biology. This fix on fruit fly genetics has had practical implications throughout biological research. Scientists are trying, for example, to trace the origins of behavioral traits to the responsible band or bump on the striped chromosomes, to illuminate the roles of "nature" and "nurture" in behavior. Learning behavior has been a major target for such studies.

A new and carefully designed study of fruit fly learning behavior is reported in the Sept. 4 NATURE. Geneticist D. A. Hay of La Trobe University at Bundoora, Australia, has constructed an ingenious maze to test the learning abilities of different strains of *D. melanogaster*. He tried (and seems to have succeeded) to circumvent the plethora of pitfalls in arthropod learning experiments, and concludes that he has demonstrated genetic differences in fruit fly learning.

His maze (see schematic) has opaque tops and sides and transparent inner dividing walls. A fluorescent light shines the width of the maze from behind the collection tubes (labeled +5 to −5) and attracts the flies from the starting tube through the maze. The flies are forced initially to turn either right or left, then to make a series of six turns—right-left, right-left, etc., or left-right, left-right, etc.—depending on the first turning choice at the starting tube. There are two more bifurcations higher in the maze that provide turning choices. If the flies have "learned" the proper turning sequence for following the outer walls, they will end up in the ± 5 tubes. The degree to which they have flunked the learning exercise is reflected when they end up in the ±4, ±2 or ±1 tubes.

Hay tested 100 males and 100 females of each of 10 strains. He found statistically significant evidence that some strains are more likely than others to follow the outside walls and end up in the ±5 tubes. By comparing the chromosomal differences between the smart strains and the dumb strains, it may thus be possible to detect the location of the fruit fly "learning genes," if these indeed exist.

Hay's is not the first *Drosophila* learning experiment. Other investigators, including Seymour Benzer and colleagues of Caltech and H.C. Spatz and colleagues of the University of Freiburg (SN: 6/15/74, p. 391) have attempted to show behavioral conditioning in fruit flies. But the use of positive reinforcements (odors, for example) and negative reinforcements (electric shocks) in the previous experiments have muddied the evidencial waters, Hay believes. In his test, "mere progress seems to constitute some differential reinforcement for repeating the same choice," and thus the flies' behavior can be considered true "exploratory learning," he says. □



Nature/Hay

'Smart strains' follow outer walls to ±5.

Elements 112, 114: Inert gases?

Element 114 hasn't yet been found, but already chemists are worried about its chemical behavior. Such a concern is not merely an exercise in the purest of pure chemistry; it is relevant to attempts to find or manufacture the ultraheavy elements since by their chemical behavior they will be known. In a recently published calculation Kenneth S. Pitzer of the Lawrence Berkeley Laboratory presents "the striking conclusion" that elements 112, 114, and 118 are relatively inert gases (JOURNAL OF CHEMICAL PHYSICS 63:1032).

The three elements considered are members of the so-called island of stability, a sequence of ultraheavy elements that nuclear theorists expect to be stable or relatively so and therefore of physical, chemical and practical interest. Many laboratories all over the world are straining to discover or synthesize them.

To find out what their chemical properties would be requires a consideration of their place in the periodic table and a calculation of the orbits of their electrons. The orbital data lead to closed electron shells, and therefore a prediction of relative chemical inertia. Periodic-table considerations lead to deduced binding energies that would make these substances, in elementary form, either gases or very volatile liquids.

This seems a bit of a surprise because most of the known transuranic elements have been metallic solids. Yet Pitzer points out that predicting the properties of mercury on the same basis would make it out a volatile liquid, which, in fact, it is.

Compounds of 112 and 114 would be far less strongly bound than those of their periodic-table congeners, mercury and lead. With a few exceptions (example: the fluoride of 112) the compounds would be unstable. The moral of Pitzer's tale is that "these properties of great volatility and ease of reduction to the element would appear to provide better separation methods than procedures based on uncertain similarities in solution chemistry of 112 to mercury and 114 to lead." □