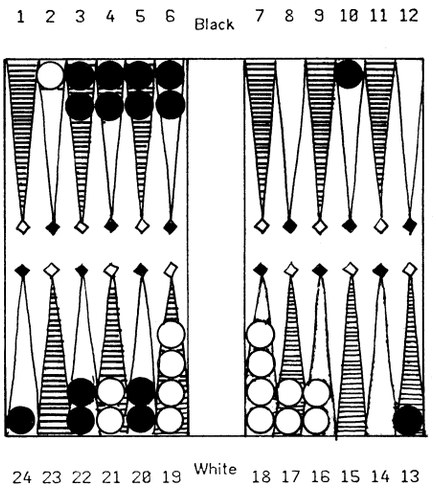
Now it's test-tube twins

Although the United States' first test-tube baby clinic so far has had no luck in getting *in vitro* fertilized human eggs to "take" in women's wombs (SN: 10/11/80, p. 231), a group of Melbourne, Australia, scientists are achieving a number of successes, according to an article in the Dec. 18/25 NEW SCIENTIST. Last year, Australia's first test-tube baby was "midwifed" by Ian Johnston of the Royal Women's Hospital, Carl Wood of Monash University, Alan Trounson of Queen Victoria Medical Centre and colleagues. And now the researchers report that, by modifying their techniques, they have managed to get 10 more *in vitro* fertilized human eggs to take in women's wombs. Four of the fertilized eggs comprise two sets of nonidentical twins.

One of the modifications consists of obtaining eggs for *in vitro* fertilization after artificially inducing ovulation in prospective mothers rather than obtaining the eggs during the women's natural ovulatory cycles. This approach made it possible for the researchers to arrange the time of ovulation and *in vitro* fertilization in advance. Another of the changes consists of giving prospective mothers a fertility drug that sometimes produces more than one egg at ovulation. Thus, in some instances, the investigators were able to fertilize, *in vitro,* more than one egg from a prospective mother and then simultaneously implant two *in vitro* fertilized eggs back into her womb, increasing the chances of at least one of the eggs taking. In two of the women implanted with two eggs at the same time, both eggs took; hence the pending arrival of two sets of nonidentical test-tube twins. Other improvements were made in implanting an egg in the womb. □

Teaching a machine the shades of gray

The die showed a 5 and a 1 for the challenger's turn in a match with the world backgammon champion. In a seemingly reckless manner, the challenger—playing black—moved one man from position 13 to 8 and another from 3 to 2, leaving several men standing alone, vulnerable to being sent home. But the player did not mind exposing additional men, because the reckless attack, coupled with the already fine defensive position of black, meant two chances to win. It was a highly imaginative and correct judgment that, previously, the challenger would have had difficulty exercising. The challenger was a computer.



The computer won the backgammon match with the help of a new program constructed by Hans J. Berliner of Carnegie-Mellon University in Pittsburgh, Pa. It was the first time that a computer beat a human world champion in an intellectual activity. The real significance of the backgammon match, though, lies not in that "first," says Berliner, but rather in the success of his computer program design in "capturing the essence of judgment...to allow machines to deal with relatively ill-defined, fuzzy situations." Berliner detailed the rationale behind his successful computer program at the recent meeting in Toronto of the American Association for the Advancement of Science.

Berliner explained that one of the original methods of designing game-playing programs—"telling" the computer in advance what to do in any given situation—cannot be utilized for games with numerous possible moves and sometimes conflicting rules. Another method that has been investigated involves a program that looks for the consequences of each option in a given situation by searching branching chains of possible moves and countermoves before one is chosen. But, "It is

Health research may change under Reagan

It's still too early to know what changes or new initiatives Ronald Reagan plans for federal health and research agencies. But discussion of what his advisers have been studying—described by William B. Walsh, chairman of the President-elect's transition-team task force on health — offers some solid clues.

For instance, "the $4 billion or so" budgeted for the National Institutes of Health "was not spent appropriately," Walsh said Monday during a Washington Journalism Center conference at the Watergate Hotel. Plans to rein the federal budget tighter over the next few years mean appropriations for biomedical research will probably level off, Walsh explained. But "just increasing funding does not increase quality research," the research cardiologist and Georgetown University professor added. The "only way to increase research funds" during these hard times, he said, "is to increase the efficiency of the funding process." For NIH that translates into "a redistribution of authority" so that the director "can run the place," Walsh said.

Too many of the national health institutes "don't respond to goals set by [the NIH] director; each institute acts virtually autonomously under the auspices of its own congressional sponsor, Walsh criticized. He indicated that the task force recommended to Reagan that the architecture of NIH's management be recrafted so that the research agency's director can redistribute biomedical funds throughout for a more equitable and efficacious use of precious federal dollars. Will such changes really come to pass? "I pray to God that they will," Walsh said, "but they won't take place in the first six months or year," when more pressing issues rivet attention elsewhere.

In addition, Walsh indicated that the Food and Drug Administration would work toward reducing regulations that he claimed are strangling profitability of the drug industry. He said there was a need to speed FDA approval of new drugs, to ease regulations affecting the export of drugs manufactured in the United States and to relax current restrictions involving clinical (human) trials of new drugs.

Research by industry — which often costs $4 to $6 million a year for each new drug—has dropped by two-thirds over the past 10 years among U.S. pharmaceutical firms. To encourage these firms to pump more private money into research, Walsh talked about extending the initial 17-year patent rights on drugs so that it begins on the date of market introduction, not discovery. □

Growth hormone test

Healthy adult volunteers received the first doses this week of human growth hormone made by genetically engineered bacteria. The trial at Stanford University School of Medicine is expected to last 20 days to determine the initial safety of the bacterial product. Then year-long clinical trials on patients 4 to 13 years old suffering from hypopituitary dwarfism will begin in London (SN: 1/3/81, p. 8) and in several medical centers in the United States. The trials were announced by Genentech, Inc., the South San Francisco firm that has used recombinant DNA technology to produce substances including growth hormone and insulin, which is already undergoing clinical trials (SN: 1/3/81, p. 8). "For both hormones, recombinant DNA techniques hold the promise of unlimited supplies," Genentech says. □

impossible for even the fastest of computers to examine all moves very deeply because of what is known as the exponential explosion," Berliner says. If, for example, 35 moves are possible at each turn for each opponent, then examining one move for each side involves searching through 35^2, or 1,225, terminal situations. Although computer scientists have improved the efficiency of these searches, the computers still are unable to make judgments about the ever-changing situation in complicated games such as backgammon.

Berliner set out to give his computer the ability to make those judgments by providing it with complex "real-world knowledge." All of the knowledge of artificial intelligence is stored in formulas. Sometimes the formulas are simple, linear functions: A=2B, for example, can represent, "Oranges are twice as valuable as apples." But simple, linear formulas rarely represent complex situations. (During a glut of oranges on the market, A=2B may no longer represent the orange-apple relationship.) Instead, Berliner says, the backgammon-playing computer needs SNAC: a Smooth, Non-linear function with Application Coefficients — the slowly varying items in each term of the formula that can represent subtle changes in a situation.

The equation "Value = $C_1A_1F_1 + C_2A_2F_2 + \ldots C_nA_nF_n$" illustrates some of the characteristics of a SNAC function. The F_i's (where i is 1 through n) represent the number of items of a certain type that exist in a particular situation, the C's represent their unit cost or value and the A's represent "the importance of the term i given certain global information about the present situation."

Using a modification of this SNAC program, a Berliner computer has retired from playing backgammon to coach — analyzing players' moves and explaining whether they are good. The general public "firmly believes" that it is impossible for a computer to conduct such analyses, Berliner says. "This is partly because no such machines have existed, and because it is generally thought that machines operate in an all-or-none mode where they can deal with black and white, but have trouble with shades of gray. However, this is a faulty view as this research demonstrates." □

Antiobesity drug may counter cancer, aging

A drug that counters obesity, prevents cancer and retards aging sounds too good to be true, but it just might become a reality if research reported at the AAAS meeting by Arthur Schwartz of Temple University Medical School in Philadelphia pans out. The wonder drug would be the adrenal gland product dehydroepiandrosterone (DHEA), or an analog thereof.

A great deal of animal and clinical studies have suggested that undereating can both prevent cancer and extend life span, the latter perhaps resulting from the former. Obesity, for instance, is believed to be a causative factor in certain types of cancers because it produces an increase in hormones known to be associated with those cancers. As for research on DHEA, it has been found that women who secrete subnormal levels of DHEA breakdown products are predisposed toward breast cancer. When DHEA was given to a genetically obese strain of mice, it kept them from becoming obese, and levels of DHEA have been found to drop off markedly when humans age. Pulling all this evidence together, Schwartz and his colleagues developed a fascinating hypothesis: DHEA might have not only an antiobesity effect but also anticancer and antiaging effects because it appears to counter cancer and aging just as caloric restriction does. They tested their hypothesis with two experiments.

The first was on mice of the same age with a genetic predisposition toward both breast cancer and obesity. Twenty-five mice got DHEA three times a week for a year; 25 did not. At the end of the year, the DHEA-treated mice had far fewer breast cancers than did the mice that did not get DHEA. What's more, the DHEA-treated mice looked younger — their coats were glossier and less gray than those of the control animals. The second experiment was conducted on mice of the same age with a genetic predisposition toward breast cancer but not obesity. Seventy-five mice got DHEA three times a week for a year; 75 did not. At the end of the year, the DHEA-treated mice had a much lower incidence of breast cancer than did the non-treated mice — even lower than for the DHEA-treated mice with a predisposition toward obesity. Once again, the DHEA-treated mice looked younger than did controls. The results of both studies, Schwartz and his colleagues conclude, "suggest that DHEA treatment may duplicate the antiaging and anticancer effects of caloric restriction."

Schwartz told SCIENCE NEWS that he and his team are now collaborating with a drug company to make DHEA analogs that are even more effective than DHEA. If they find an ideal one, they will attempt to get Food and Drug Administration clearance to test it in a clinical trial to see whether it can prevent breast cancer in women. The trial would probably be conducted on women at particularly high risk of breast cancer because of genes or other risk factors.

Schwartz is also optimistic that DHEA, or an analog thereof, might eventually be used as an antiaging drug in humans. He and his co-workers are now testing DHEA in rodents that are not predisposed to breast cancer or obesity to see whether it can extend their life spans. Preliminary results, he says, look promising. □

Proper diet saves lives, land, oil . . .

Eat more fruits, vegetables and whole grains and consume less animal fat, meat, cholesterol, salt, sugar and other highly refined foods. Nutritionists have been telling us this for years, and their major argument has been the beneficial health effects of a proper diet. At the AAAS meeting, a session titled "National Impacts of Recommended Dietary Changes" reviewed the health consequences of a good diet and then went on to conclude that changes in our eating habits can have significant beneficial effects on everything from land, water, fuel and mineral use to the cost of living, employment rates and the balance of international trade.

The session was arranged by Alex Hershaft of the MITRE Corp. in McLean, Va. He traced our current eating habits and tendency toward overconsumption of meat to the post-war economic situation that demanded that productivity (including farm productivity) be kept at a war-time level in order to forestall a major depression. Consequently, Hershaft explains, the U.S. Department of Agriculture found itself saddled with vast, perishable and costly stores of grain, legumes and other staple foods that had been purchased to support farm prices. To alleviate this storage problem, the USDA encouraged the expansion of animal agriculture and the establishment of feedlots where the grains and legumes could be used. The next step was a massive promotional campaign that eventually doubled the per capita consumption of beef—to about 95 pounds per year.

The well-known health effects of this increase in animal agriculture and increased consumption of beef, milk and eggs were discussed by J. A. Scharffenberger of the San Joaquin Community Hospital in Bakersfield, Calif. Citing a number of studies, he concluded, among other things, that: Elimination of animal products from the diet can reduce the rate of coronary heart disease by as much as 88 percent; dietary changes can possibly reduce the incidence of cancer by as much as 50 percent (the three major dietary factors in cancer causation are obesity, animal fat and lack of fiber, or whole grains); proper diet can help control weight and thus help reduce the risk of hypertension, coronary heat disease and cancer.

Going beyond the health effects, Georg A. Borgstrom of Michigan State University in East Lansing urged that the effects of land and water use be included in dietary debates. The United States, he says, has climbed to the pinnacle of the world in terms of per capita consumption of animal proteins and along the way has strained land and water resources to the point where we now hold the world record for the consumptive use of water for food