

Maternal confidence: Separation from young

Harry Harlow's classic experiments with rhesus monkeys clearly demonstrated the importance of mother-child interaction during the first weeks of life. His work at the Wisconsin Regional Primate Research Center pointed out that separating an infant from its mother can have lasting effects on both infant and mother. Isolated infants develop abnormal social and sexual behaviors. The mothers fail to display normal maternal behaviors when reunited with the infants. In the past, studies of human mother-infant separation have concentrated on the detrimental effects of separation on infant development. Now, a group at Stanford University is examining the effects of such separation on mothers.

In human societies, prolonged separation of mother and infant immediately after birth is a relatively rare occurrence. But in the case of premature births, it is usual hospital practice to isolate the infant from the mother until it measures up to certain health and weight standards. This may take up to 12 weeks. Marjorie J. Seashore, Aimee Dorr Leifer, Clifford R. Barnett and P. Herbert Leiderman used this situation to do a 21-month follow-up study of the effects of infant-mother separation. In the June *JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY* they report the results of the first month of their study. They focus on one aspect of separation: the psychological effects of separation on a mother's self-confidence in her ability to care for her infant.

Two groups of mothers took part in the study. In the separation group, 21 mothers were allowed to view their infants from a nursery window but had no other contact with them while they were in the intensive-care nursery. Another 22 mothers, the contact group, were allowed to enter the intensive-care nursery and handle, diaper and feed their infants. After the babies were moved to the discharge nursery, all the mothers were allowed to care for their babies. All mothers were tested, observed and questioned after they first saw their babies in the intensive-care nursery, after their first visit to the discharge nursery, one day before discharge and one month after discharge. At the first testing, before any mothers were allowed to contact their infants, the groups were nearly equal in self-confidence. Those who already had a child showed the most self-confidence. At the second testing, after all mothers had been allowed to care for their infants in the discharge nursery, the effects of separation were significant. Self-confidence was lower among all mothers of the separation group, but

especially among those who had just had their first child. For these mothers, self-confidence had decreased since the first testing. The effects on this group were still evident at the final testing. In feeding, diapering and bathing the infant they were least confident of their own ability. This was two or three months after the child's birth.

In the case of premature births, mothers lose self-confidence because they are denied the opportunity to learn and practice caretaking skills. Hospital procedures make the mothers feel even more inadequate by placing the child in someone else's care. And, finally, the premature birth itself may give the mother feelings of biological incompetence. Even though the mothers of both groups in the study received a great deal of psychological support during the separation period, the effects of separation were not completely overcome one month after discharge. The researchers suggest that in instances where psychological help and counseling are not available, the effects of separation might be even stronger and longer lasting. These effects, they conclude, should be examined. □

Training starlings to stay away

Many people consider starlings among the ugliest and most obnoxious birds alive. What is worse, ever since they were brought to the United States from England, they have become horrid pests because they do not have their natural predators to keep them under control. Starlings decimate grain in cattle feedlots, costing cattlemen thousands of dollars. Starlings swoop down on city buildings by the thousands like some horror out of the movie "The Birds." And unlike sparrows, whose numbers now appear to be leveling off, starlings are still proliferating rapidly.

A few years ago, a man became legendary and wealthy by selling to cities a mysterious black box. The box made starlings leave. The box turned out to make sounds that mimic the distress calls of starlings. The problem with sound eradication, though, is that starlings eventually returned to the cities. People have also tried poisoning starlings with pesticides. Cattlemen in

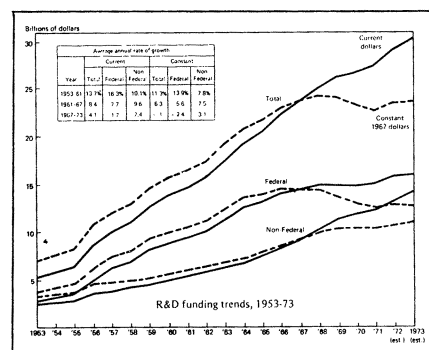
R & D funds drop as percentage of GNP

Total spending for research and development in the United States is expected in 1973 to continue to decline as a proportion of the gross national product, according to a new report this week from the National Science Foundation. The figures indicate that R&D will account for 2.4 percent of the GNP in 1973. This ratio is down from 2.5 percent in 1972 and a high of 3.0 percent in 1964.

Total R&D spending in 1973 is expected to reach \$30.1 billion. In actual dollars this is a 3 percent rise over the 1972 level of \$29.2 billion. But inflation negated that increase. In constant dollars, there is no change expected between 1972 and 1973.

The figures provide a graphic indication of the toll inflation has taken of the research and development dollar. In current dollars, total R&D spending grew at an annual average rate of 4.1 percent from 1967 to 1973. But in constant dollars, R&D spending shrunk an average of 0.1 percent a year.

The figures include both Federal and private R&D spending. They show a continuation of a trend increasingly visible in recent years: a decline in Federal support of R&D (in constant dollars) and a rise in non-Federal support. If present trends continue, non-Federal support would equal Federal support within a few years, a situation that hasn't occurred since the beginning



NSF
U.S. R&D funding, 1953 to 1973.

of Eisenhower's first term.

Federal funds paid for 53 percent of the \$30.1 billion total R&D in 1973. Of the remainder, industry is expected to account for 41 percent, universities and colleges 4 percent and other non-profit institutions 2 percent.

The study points out that other countries, particularly Germany and Japan, are showing marked gains in research and development activities in recent years compared with the United States. Germany and Japan have registered sharp increases in their ratios of R&D to GNP. And from 1967 to 1971 while the United States was undergoing a 16 percent growth in total R&D expenditures (in constant dollars), Japan registered a gain of 150 percent and Germany a gain of 90 percent.

The figures are contained in an NSF report entitled National Patterns of R&D Resources 1953-1973. It is based on surveys conducted by NSF. □

the West are doing it now. The difficulty with pesticides is that birds that prey on the carcasses of the poisoned starlings get pesticides in their bodies. Clearly something better is needed to get rid of starlings.

C. Val Grant of Utah State University has come up with a technique that may do the trick. It consists of training starlings to avoid feed that is mildly poisoned, and to have those starlings teach other starlings to do the same thing. Mildly poisoned food would then be spread in areas where starlings were unwanted to induce them to stay away. Mild poisoning would be less dangerous to humans and other animals than poisoning intended to kill. The Logan, Utah, behavioral ecologist described his research at the annual meeting of the American Institute of Biological Sciences held this week in Amherst, Mass.

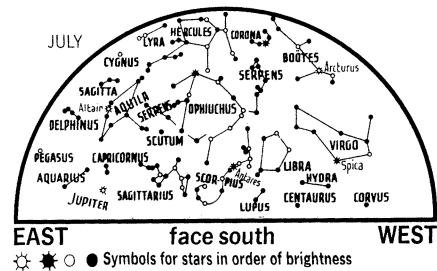
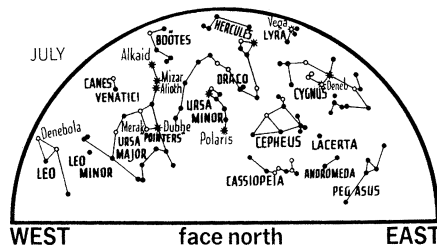
Grant put enough of a carbonate pesticide, Methiocarb, in feed pellets to make starlings become sick and vomit. He then did an experiment with three groups of starlings. A control group received a normal diet. Other birds got a regular diet every other day, and a mildly poisoned diet in between. Still other starlings received a mildly poisoned diet for seven successive days.

Grant found that the eating habits of the control birds stayed the same. The birds getting intermittent diets of poison slacked off in eating when poisoned feed was given to them, but they returned to eating when normal diets were made available to them the next day. The birds that received a continual diet of poison, however, stopped eating after the third day. Even when normal food was made available to them for a month following the poisoning test period, their eating was reduced considerably.

Convinced that he had induced avoidance behavior in the starlings, Grant put them in an outdoor aviary that was like an open field. The birds continued to avoid poisoned pellets. Most fascinating, Grant says, was the discovery that naive starlings put in the aviary followed the eating habits of the trained starlings. They would not eat the poisoned pellets.

Grant now will try to see whether starlings can discriminate between poisoned pellets and nonpoisoned pellets. He hopes not. If they cannot discriminate, then poisoned pellets put near a feedlot should deceive the starlings and keep them away from the lot.

The training technique might also be used to chase starlings out of cities, Grant hopes. Although starlings prefer insects, they adapt amazingly well to other foods. So whatever they eat in cities might be mildly poisoned without hurting people or other animals. □



Bright planets on evening display

by James Stokley

July will bring one of the best evening sky displays of the bright planets seen in several months. Venus, conspicuously low in the west as darkness falls, sets about an hour and a half after sunset. Jupiter is in the southeast in the constellation Capricornus. Opposite the sun on July 30, it is visible all night. About midnight Mars appears in the east in Pisces. During the last half of the month Saturn will be visible low in the east just before dawn.

Jupiter is the largest planet in the solar system—88,700 miles in diameter—nearly 11 times that of earth. With a volume 1,318 times as much as earth, it contains only 318 times as much matter. This is, however, more than that of all the other planets combined. Its density is thus quite low, about one and a third times that of water or about a quarter as dense as the earth.

Viewed through a telescope its disk is crossed by light and dark bands in a variety of colors: orange, red, brown and sometimes even green. These are the tops of clouds surrounding the planet. They seem to consist largely of frozen ammonia but the atmosphere seems also to contain hydrogen and methane (marsh gas).

In recent years astronomers have supposed that Jupiter's atmosphere extended down to a depth of about 8,000 miles. Then came a layer of ice and slush some 17,000 miles deep with a central core of rock and metal over 38,000 miles in diameter.

According to this theory Jupiter consists of about 10 percent hydrogen, a proportion which seems too low to some astronomers. Jupiter and the other major planets, they suppose, were formed of material like that of the sun. The sun contains more than 90 percent hydrogen.

An English astronomer, William H. Ramsey, has suggested that Jupiter has no rocky core but consists entirely of a mixture of gases. Deep inside the planet, however, the weight of the outer layers would be so great that the gases would be compressed to enormous densities. At very high pressure hydrogen changes to a metallic form, which conducts electricity and

resembles sodium and potassium. Pressure deep inside Jupiter is many times that needed to produce this change.

The new theory, which many astronomers now favor, is that Jupiter consists mainly of hydrogen, along with some helium and other gases. At a depth of about 9,000 miles the hydrogen is in the metallic phase but perhaps liquid. There may be a solid core of metallic hydrogen at the center.

Some of the information gained by Pioneers 10 and 11, now on their way to Jupiter, may help planetologists to solve many questions concerning that planet.

Six first-magnitude stars are also visible: Vega in Lyra; Deneb in Cygnus; Altair in Aquila; Spica in Virgo; Arcturus in Boötes and Antares in Scorpius.

Scorpius is at its best evening position of the year. It is now as high in the southern sky as we ever see it from our northern latitude. In countries south of the equator, where it appears overhead, you can see what a magnificent constellation it really is.

A good way to locate Arcturus is to look in the northwest for the familiar Big Dipper, in Ursa Major. Follow the curve of its handle to the south and you come to Arcturus. To the right of the Dipper is Ursa Minor with Polaris, the polestar.

The two maps show the sky as it looks about 11 p.m. (local daylight saving time) on July 1, 10 p.m. on the 15th and 9 p.m. on the 31st. □

CELESTIAL TIMETABLE		
July	EDT	
1	11:00 pm	Moon passes south of Venus
7	4:26 am	Moon in first quarter
12	6:00 pm	Moon farthest, distance 252,200 miles
15	7:56 am	Full moon
16	6:00 pm	Moon passes north of Jupiter
20	2:00 am	Mercury between earth and sun
22	11:00 am	Moon passes north of Mars
	11:58 pm	Moon in last quarter
28	3:00 am	Moon nearest, distance 224,100 miles
29	2:59 pm	New moon
31	midnight	Moon passes south of Venus