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## Endorphins for emotions: A good beta

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"We're probably setting psychiatry back 100 years," says Nathan S. Kline, "but there's nothing we can do about it." When one considers that the age of specialization has not bypassed psychiatry, Kline's tongue-in-cheek observation may have a ring of truth to it. After all, he notes, the discovery that one compound appears to help two distinct psychiatric problems — depression and schizophrenia — is somewhat inconsistent with current trends of treating each of the two conditions with distinct, specialized drugs.

But in a follow up of work presented last year (SN: 9/17/77, p. 182), Kline reports that beta-endorphin — a naturally occurring protein in the brain — is surprisingly effective in trials with both depressives and schizophrenics. Moreover, some chronic schizophrenics have, in effect, recovered, and continue to improve more than 10 months after their last beta-endorphin injection, Kline reported at an American Psychiatric Association regional meeting in New York City.

"There is very little doubt at the moment that, for whatever reason, beta-endorphin is effective [in depression and schizophrenia]," Kline says. For a number of reasons, however, he estimates it will be two or three years before the treatment is available on a clinical, nonexperimental basis. The primary drawback is the cost — about \$3,000 per injection. A number of

drug companies, primarily in Europe, are currently working on cheaper ways to produce the compound, according to Kline, director of the Rockland Research Institute in Orangeburg, N.Y.

Another problem is that the improvement with depressed persons, while dramatic, lasts only four to six hours — that's more than \$500 an hour. This was surprising to Kline, who believed that since the compound seems to attack cells in the amygdala portion of the brain, it would influence affective disorders, such as depression, more readily than schizophrenia. But he found that though the injection triggered sharp mood rises in seven depressed persons within two to three minutes, the improvement lasted only a few hours.

The half-dozen schizophrenics tested, however, continue to live relatively normal lives more than 10 months after receiving seven beta-endorphin injections over a three-month period. The group includes one man who had been almost totally nonfunctional for 15 years and is now living on his own and working at a regular job, Kline says. He suggests that the balance of beta-endorphin "may be the body's own way of managing mood swings" and that developing the compound as a standard treatment could provide "something more rapid than present-day treatments." □

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## Inadequate equipment threatens U.S. R&D

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President Jimmy Carter's aim to stabilize or even lower inflation by reducing government spending will likely not involve cutting research and development budgets. According to the Washington Post, Carter signaled his intent to White House aides in a memorandum last week, saying, "I want to maintain our strong support for R&D as [percentage] of budget." Whether this means R&D will be exempt from federal-spending restraints or not, however, may depend on the nation's response to the voluntary anti-inflation program that Carter proposed, his aides say.

Carter's R&D support was handwritten in the margin of a memo sent to him a week earlier by his science advisor, Frank Press. Press and James J. McIntyre, director of the Office of Management and Budget, were seeking Carter's guidance on plans for the (fiscal year) 1980 R&D budget.

The same day Carter passed on his R&D memo, a committee of scientists met in Washington with Carter advisors to discuss what might be done to increase the share of R&D funds devoted to instrumentation. The United States is falling behind other nations in terms of the rate at which scientific work is done and in the general

competence of its researchers, the scientists charged. They cited an "accelerating decline in the quality, quantity and development of scientific instruments available for research" as a primary reason why.

A year ago, Press and OMB's Bowman Cutter said the same thing in a memo to the President. Although Carter approved their accompanying recommendation that more funds be channeled into instrumentation, the ad hoc committee on instrumentation that met with Press, OMB and others last week said this recommendation is "threatened" by the current economy.

Instrument-replacement costs have risen sharply over the last decade, as have demands for instrumentation because of expanded applications. Meanwhile, there has been a decrease in available equipment funds resulting from a 19 percent decline in constant-dollar federal-research expenditures and from increased pressures to maintain ongoing research despite increasing costs for workers and supplies. Because inflation of instrument costs exceeded 100 percent in many cases during this period, the scientists say the net decrease in instrumentation funding

"exceeds by far the estimated 19 percent decline in the support of basic research."

The ad hoc committee believes that in the present economic climate, "attempts will undoubtedly be made to solve the problem by mandating that each funding agency devote a larger fraction of its constant or declining budget to instrumentation." But if the money earmarked for instruments shortchanges the budget for the personnel and supplies needed to use them effectively, the result amounts to little more than substituting one debilitating problem for another, they say. Instead, money should be spent on increasing and creating new opportunities to share technological resources, the ad hoc committee says. The cost of sharing expensive (\$100,000 or more) equipment is less than the cost of duplicating such equipment at several facilities.

Facilities housing such equipment, however, often are not compensated for the additional maintenance and repair, extra trained personnel and round-the-clock supervision required of equipment used by other than the principal researchers. Provision for such extra costs would increase the efficiency and effectiveness of existing advanced instrumentation centers, the ad hoc committee says, and should be ensured.

Stanford University's Oleg Jardetsky and other directors of regional instrumentation facilities on the ad hoc committee say the problem is acute in chemistry and biology. This research is generally performed by a single faculty member and students at a university, they say, on relatively small grants — grants too small to pay for instrumental technological advances that could increase the quality of their research. □

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## Safer diagnosis for sickle cell anemia

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Two years ago, Yuet Wai Kan and his genetics team at the University of California in San Francisco made a major advance in the prenatal diagnosis of inherited diseases. They diagnosed sickle cell anemia in living human fetuses (SN: 5/22/76, p. 325). The technique, however, required great obstetrical skill and carried the threat of a seven percent risk of fetal death, since the sickled hemoglobin peptide chain that causes the disease could only be identified in red blood cells obtained from the fetus. Prenatal diagnosis of other genetic diseases, in contrast, can be carried out using any kind of fetal cell, thus making diagnosis a lot easier and safer.

Now, Kan and his colleagues have found that they can also use any kind of fetal cell to diagnose sickle cell anemia in fetuses, making sickle cell diagnosis much safer than with their initial technique. Their new method, reported in the Oct. 28 LANCET, makes use of enzymes that cut up DNA

molecules at select sites. The discovery of such "restriction enzymes," in fact, earned a Swiss and two U.S. scientists the 1978 Nobel Prize in Medicine (SN: 10/21/78, p. 276). This is the first time that restriction enzymes have been used for medical diagnosis.

The new advance from Kan and company all started when they recently found that a specific DNA cutting enzyme, called Hpa I, cut the gene for the beta hemoglobin peptide chain out of DNA molecules in two different lengths. In other words, the enzyme would carve out the gene plus a few extra base sequences in one instance, and the gene plus numerous sequences in the other. What's more, the researchers found the shorter fragments were present in people without sickle cell anemia, both shorter and longer fragments in persons who carry the sickle cell trait and only longer fragments in individuals with sickle cell anemia. Why should Hpa I selectivity in chopping up a DNA molecule correlate with the presence or absence of a sickle cell gene? Kan and his colleagues aren't sure. They suspect that a gene probably also determines the receptor site at which Hpa I can go to work on a DNA molecule, and that this gene is usually inherited along with the gene for the beta hemoglobin peptide chain.

Whether true or not, though, the discoveries by Kan and co-workers prompted them to ask: Why not use the unexpected correlation between the sickle gene and longer fragments chopped by the enzyme to diagnose sickle cell anemia in fetuses? The researchers found the idea particularly attractive, since the link could be made in DNA taken from any kind of fetal cell, not necessarily fetal blood cells. (The reason is that each cell in a person contains all the existing genetic material, whether all of the material is expressed or not.) Thus, diagnosis of sickle cell anemia would be much safer than with the initial technique. They tested their idea and report that they have now successfully diagnosed two fetuses with it. Both were found to have the trait, not the actual disease. The technique has also been applied to two more fetuses; results are pending.

The technique works essentially like this: Amniotic fluid is drawn from the mother's womb, as in the usual prenatal diagnosis. Hpa I is put in the presence of DNA molecules taken from fetal cells in the fluid, and it chops up the DNA molecules. If all the fragments that result are short, it indicates that a fetus has no genes for sickled hemoglobin chains. If both shorter and longer fragments result, then the fetus is a carrier. And if only longer fragments ensue, then the fetus has the disease.

Before this method can be widely used, Kan and his co-workers must determine precisely how accurate it is. There are indications that the gene that decides whether Hpa I will cut a DNA molecule does not always correlate with the presence or absence of a sickle cell gene. □

## Last days of the Condor?



National Audubon Society

*Only 16 California Condors, the lowest count ever, were sighted October 17 and 18 in the annual Condor survey. Adult Condors can weigh about 20 pounds and have a wingspan of more than 9 feet. In an attempt to save North America's largest land bird from extinction, an advisory panel has proposed further research, a captive breeding program and preservation of Condor habitat.*

## An interaction by any other name

Ever since the famous polarized-electron experiment at the Stanford Linear Accelerator Center last summer (SN: 7/8/78, p. 20), a lot of physicists have been going around saying that there are no longer four classes of force in nature, but only three. The apparent success of what is called the unified field theory in putting together electromagnetism and the weak subnuclear interaction into a single description, which was so convincingly confirmed for many by the Stanford experiment, leads to a problem: what to call the newly unified interaction.

CERN COURIER reports that Abdus Salam, one of the people who started the work on the unified field theory, has been going around calling it "electroweak." This follows the historical precedent whereby the 19th century coined electromagnetism out of electricity and magnetism, but to those of us who do not enjoy Swiss efficiency at hydroelectric production, it sounds a little like a word to describe the air conditioning in New York City on a hot summer afternoon.

A friend of CERN COURIER's in Edinburgh

suggests going to the venerable tradition of using Greek roots and so coins "asthenodynamics" from the Greek "asthenis," which means not strong and could serve as antithesis to chromodynamics, the theory of the strong interactions, a class of force not yet in the net.

Now ideas that come from Edinburgh should be treated with respect, because the Higgs bosons, the particles that make so much possible in the unified field theory business, were thought up there. However, we would like to point out that physicists now have the habit of making up acronyms, even acronyms that aren't, like SPEAR and ISABELLE, and so we propose "ivbodynamics" in honor of the intermediate vector bosons, the particles that carry the forces. When the unification proceeds somewhat further, we might call it higgbodymatics, and for the last stage of all, there is only one word: "Neurasthenia." □

## Cosmonauts return



Novosti

*Commander Vladimir Kovalenok and Flight Engineer Aleksandr Ivanchenkov.*

Far outlasting previous manned space flight attempts, Soviet cosmonauts Vladimir Kovalenok and Aleksandr Ivanchenkov returned last week after 140 days in orbit aboard the Salyut 6 space station. Their achievement, well timed for the 61st anniversary of Soviet power, surpassed the 96-day record set earlier this year by the Soviets and left the 84-day Skylab record in the dust.

But, according to Soviet news agencies, the cosmonauts were not just marking time. Kovalenok and Ivanchenkov hosted two other pairs of cosmonauts, including a Pole and an East German, and received three visits from unmanned Progress supply craft ferrying food, fuel and touches of home such as garlic and a guitar. Studies of crystal growth and the manufacture of alloys and optical materials under weightless conditions dominated the cosmonauts' research. Soviet sources say they produced materials with "new mechanical, electrical and thermal properties." Other studies, in cooperation with Poland and East Germany, included photographing those countries and the Soviet Union to track seasonal natural changes. □