

3/8/75, p. 148) and has wrestled all year with the details of self regulation only sketched in by the larger, international group. The advisory committee, headed by NIH administrators DeWitt Stetten and Leon Jacobs, met last Thursday and Friday in La Jolla, Calif.

The difficult job of translating general guidelines into specific ones was complicated by growing dissension, both inside and outside the committee, over just how that translation should read. The committee came to La Jolla with three separate versions of proposed guidelines, written since February, and by some minor miracle, arrived upon an acceptable compromise within the two-day meeting. One set was drafted at Stanford this spring. Another, which substantially weakened the first, was drafted at a July meeting at Woods Hole, Mass. The third set was written this fall following an outcry from scientists—including Asilomar organizer Paul Berg of Stanford—concerned by the weakened controls over potentially dangerous experiments.

Distilling the results enormously, the full committee at La Jolla decided as follows: The containment of DNA recombinant experiments will be accomplished by both physical and biological means. Physical levels are classified P1, P2, P3, and P4, and range from no special equipment or microbiological techniques to the use of air locks, negative air pressure and decontamination of all laboratory waste materials. Biological containment will fall into three levels: EK1, the use of standard *E. coli* K-12 organisms and virus or plasmid vectors (messengers for carrying new genetic information into host cells); EK2, hosts and vectors that have been genetically altered to reduce their ability to survive outside the laboratory; EK3, EK2-level organisms that have been tested and shown not to survive in nature.

The most significant part of the new guidelines is the assignment of types of experiments to levels of containment. These assignments depended on the committee's assessment of the dangers to man and nature involved in the "worst possible scenario" for each type. Experiments involving DNA from primates must have high containment, P4 and EK3 or P3 and EK3. Containment levels decrease as one moves down the phylogenetic list from mammals through birds, cold-blooded vertebrates, invertebrates and lower eukaryotes. Similarly, higher plants require more stringent containment than lower plants. When pathogenic hosts or vectors are used, containment levels, are, in general, increased. When sterile embryonic tissues or purified DNA fragments are used, containment levels can be decreased.

In every case, the La Jolla levels match or exceed those suggested at Asilomar. A few experiments done since February have convinced many researchers that the chance of a dangerous accident is much smaller than presumed by those who ini-

tiated the present self-regulatory measures last year (SN: 7/27/74, p. 52). But there are still gaps in understanding both potential dangers and benefits that are, in one committee member's words, "big enough to drive a truck through."

Scientists, both on the committee and in the research community at large, are divided into two groups (and the shades in between): liberals who argue that scientific progress will be impaired by overly strict guidelines, and conservatives who feel that containment should be high, even if it slows research. The conservative position won out at La Jolla, for the most part. But close votes based as much on whim and group dynamics as on solid scientific information provided some tense moments for the committee and a sobering experience for observers.

In contrast to the serious discussions, the logistics of 20 scientists moving ponderously through three guideline versions printed in variorum style and governed by Robert's Rules of Order gave the meeting an undercurrent of comedy. An honest transcription of the meeting would, almost certainly, reveal the three most common phrases to have been "Where are we?" "What's the motion?" and "What are we talking about?"

At one point, the committee came close to a serious derailment. During discussions of containment categories for amphibians, insects and lower eukaryotes, a motion was made to insert a "grandfather clause" into the guidelines to allow continuation of experiments begun under the

looser Asilomar levels at those same low levels now. The committee almost passed the motion until a speech by a respected colleague and observer Sydney Brenner of Cambridge saved them from a move that would surely have been regarded by many as buddyism and disregard for safety.

Brenner represents the more conservative view toward safety and containment common among European molecular biologists. At one point, he suggested that a dangerous experiment be done at NIH's high containment facility to establish a baseline for just how dangerous laboratory organisms such as *E. coli* K-12 and the ColE1 plasmid vector may be. Expectations are, at this point, that such hybrids may be far less dangerous than previously believed. "But," Brenner says, "if we do not do such a baseline experiment, we will have to take the undesirable approach of retrospective epidemiology on our laboratory workers."

The NIH committee, although finished with this draft of the guidelines, is far from relieved of regulatory duties. One committee member, dismayed by the huge task of regulating this burgeoning field, fears the committee will become, to paraphrase Edwin Chargaff, the Bishops of NIH. Subcommittees will, for example, screen all NIH grant requests and requests for changes in containment levels during ongoing experiments. Implementation of the guidelines is, in general, in a somewhat undefined state. But they will have to remain so, the committee decided, until the next meeting in March. □

Nova Cygni's curves: New twists in theory

A nova that reaches naked-eye brightness is unusual in a simple statistical sense, and Nova Cygni 1975, which exploded at the end of August (SN: 9/13/75, p. 165; 9/27/75, p. 196), was certainly that. More important, it now seems that the nova was astrophysically unusual too and may require new departures in the theory of what a nova is. This is the consensus of a variety of international studies of the nova reported at this week's meeting of the American Astronomical Society at Chicago's Adler Planetarium and in a preprint sent to SCIENCE NEWS by astronomers at the Torun Observatory in Poland.

The Polish observers, including Wilhelmina Iwanowska, A. Burnicki and A. Woszczyk, set the tone: "Nova Cygni 1975 is a very unusual nova. . . . It is really a very fast nova: The rate of decrease in its brightness in the early decline phase was about 1 magnitude per day." Other observers concur, though there is some disagreement on the total rise in magnitude. Some American speakers cite a rise of 19 magnitudes (a 40-million-times increase in brightness) or more. The Polish observers mention a pre-nova observation of the star by an unnamed Soviet

astronomer that rated the object at 16th magnitude, giving thus only a 14-magnitude rise.

The nova's intrinsic (as opposed to visual) magnitude at peak was calculated at between minus 9 and minus 10. This is not an unusual peak intrinsic brightness for a nova, but, as J.S. Gallagher of the University of Minnesota puts it, Nova Cygni 1975 "was the fastest ever," both in rise and fall of brightness.

Spectra taken at various places from Torun to York, Ontario, to Minnesota show complicated changes as the nova developed that often do not conform to expectations from the usual nova theory. Gallagher, using infrared observations, finds a basic astrophysical discontinuity in the nova's development. At first it shows the characteristics of a blackbody—thermal radiation from the collection of matter that makes it up. Later, a break in the spectral appearance, especially that of the emission lines of hydrogen, lead him to suspect that the matter in the supernova or the cloud exploding off it has become ionized. The radiation is now the sort of thing that comes when two unbound charged particles approach, pass and revolve around

each other without becoming bound into un-ionized matter. He finds the whole thing rather reminiscent of a scaled-down version of a supernova.

The spectral complications and the hypothesis deductible from them, the nova-like appearance of the brightness curve and the absence of certain spectral features, expected of an ordinary nova, fortuitously seem to coincide with a theoretical calculation done by S.G. Starrfield of Arizona State University, J.W. Truran of the University of Illinois, Gallagher, W.M. Sparks of the Goddard Space Flight Center, P. Strittmatter of the University of Arizona and H.M. Van Horn of the University of Rochester. This model was calculated by ignoring the existence of an important part of traditional nova theory, the presence of a binary companion star.

According to the traditional nova

theory, a nova is a white dwarf star bound in a binary system with a more or less ordinary star. The white dwarf's gravity draws matter from the companion, and this infalling matter creates an energy instability that leads to the nova explosion. If the companion is ignored, Truran told the meeting, the light curve and other features come out like Nova Cygni 1975. If the companion is put into the calculation, theory comes out like a typical nova. So they suspect that the noncompanion calculation represents Nova Cygni 1975's situation. Truran says it could either be a binary nova, in which for some reason accretion of matter from the companion had long ago ceased, or it could be an example of an entirely new kind of nova, a free-standing star that accreted material from interstellar space to trigger its outburst. □

Marijuana: Cultural and clinical studies

Contradictions abound. Studies have shown that marijuana causes or does not cause any number of serious physical, psychological and social problems. Two of the most serious charges are that marijuana reduces motivation and lowers testosterone levels. Two multidisciplinary studies, one undertaken in Jamaica and one just completed in Costa Rica, may go a long way toward answering these charges and resolving some of the long-standing contradictions that surround marijuana and its use. Both studies were discussed last week in San Francisco at the annual meeting of the American Anthropological Association.

In 1969, the National Institute of Mental Health pinpointed some of the deficiencies leading to contradictory results in marijuana studies and decided that a different approach was needed. A long-term, multidisciplinary study of more than 2,000 Jamaicans was planned. Anthropologists Vera Rubin of the Research Institute for the Study of Man in New York and Lambros Comitas of Teachers College at Columbia University undertook the study in conjunction with the University of the West Indies.

The cultural studies in Jamaica showed that the drug is used by up to 75 percent of the working-class population. Women and children often take it as tea or as a tonic. Males most often smoke it mixed with tobacco. The quality of the drug they use is about four times stronger than that usually found in the United States. The major reason cited by men for marijuana use is, "It makes me feel to work." They smoke the drug before and during work and claim that it helps them concentrate, feel better and work harder. Energy output as well as thoughts about the job at hand did increase after drug intake. The men smoked about seven joints a day.

In Jamaica, marijuana was not found to be related to the use of harder drugs

(though few were available or affordable), was found to be related to less alcohol use and was not related to crime (except arrests for using marijuana). Some psychological dependency was noted in smokers when asked to give up the drug during the clinical studies.

For the clinical part of the study, 30 male *ganja* or marijuana smokers were matched with 30 nonsmokers and given thorough physical examinations during a six-day hospital stay. Few adverse effects were found. Physical dependence, chromosome damage, brain damage and psychosis were not found to be related to marijuana use. Functional hypoxia (reduced delivery of oxygen to the tissues) was noted but appeared to be related to tobacco use rather than to the *ganja*.

Ganja in Jamaica: A Medical Anthropological Study of Chronic Marijuana Use (Mouton & Co., The Hague) was published in book form early this year, but the study has been under considerable attack since its results first began to come out three years ago. It was attacked especially because it did not confirm the then popular theory that marijuana produced an amotivational syndrome. A number of researchers and politicians continue to claim that marijuana will produce a generation of semizombies.

Both Rubin and Comitas have defended the validity of their work, but their best defense now comes from the just-completed Costa Rican study. Paul L. Doughty, William E. Carter, Wilmer J. Coggins, William R. True and John B. Page of the University of Florida released the preliminary results of their study at the anthropology meeting. The Costa Rican study, the largest controlled study yet of chronic marijuana users, was partially modeled on the Jamaican study. It confirms many of the Jamaican findings.

From a larger sample than was used in the cultural studies, a clinical sample of

41 pairs (users and nonusers) was selected and matched for age, education, marital status, tobacco and alcohol use and occupation. Up to 15 percent of the working-class males in San Jose use marijuana, averaging about 10 cigarettes a day. Most began using the drug at about age 14 as a social experience after leaving home and beginning to make their own living.

Physical examinations showed some differences between users and nonusers. Users averaged about seven pounds less in body weight and tended to have bloodshot eyes. Visual functioning, sleep and EEG studies have not been completed, but one controversial question may have been cleared up. The researchers were careful to test serum testosterone levels and could find no difference between users and nonusers. This point was emphasized by Coggins who said there was not even a trend toward a difference.

Both the Jamaican and Costa Rican studies suggest that the effects of marijuana are highly dependent on cultural expectations. But since such expectations (as well as research results) tend to be contradictory in the United States, perhaps, as Vera Rubin says, "We will have to learn about the use of marijuana from other societies." □

DAD's in the drink

A pair of U.S. satellites known as the Dual Air Density (DAD) Explorers, sent aloft on Dec. 5 to study the composition and density of earth's atmosphere at different altitudes, ended up in the water instead when their rocket malfunctioned and dumped them into the South Pacific. The two instrumented probes—a 30-inch rigid sphere and a 12-foot balloon—weighed less than 80 pounds each, making their masses low enough to respond to slight changes in atmospheric drag, thus yielding sensitive density measurements. Early analysis of the telemetry data from the hapless flight suggests that the Scout rocket's fourth stage never ignited, leaving the dead weight to pull the \$5 million double payload down to its demise. □

NOTE TO READERS

Following our practice of the last two years, the final two issues of 1975 will be combined into one double-sized issue of SCIENCE NEWS. The year-end issue is scheduled to contain a report to readers on results of the reader survey we conducted this year. It will also carry a review of the top stories of 1975, organized by scientific fields, plus the semi-annual index and our regular news and feature columns. The special year-end issue will be dated Dec. 20/27 and will be mailed Dec. 24.

—The Editor