ABSTRACTS PRESENTED AT THE ANNUAL MEETING
NOVEMBER 21 AND 22, 1975, UNIVERSITY OF TENNESSEE—NASHVILLE

GENERAL SESSION

ALBERT L. MYERS, Chairman

Energy Is No Problem, People Are. Wayne Brown, Tennessee Higher Education Commission (20 min.)

The current U.S. Energy crisis is not at this point of energy resources within this country. For a number of years the U.S. Geological Survey has systematically compiled and cataloged fossil and nuclear fuel reserves and resources. These findings coupled with calculations of increasing energy consumption indicate that this country is still many years away from depleting its supply of fossil fuel, and, of course, quite remote from depleting the nuclear sources.

Changing the primary fuel mix has been seen in the nation’s past (dominant wood to dominant coal to dominant petroleum) and will be seen again. The absence of a clear plan allows economic and related political manipulation of the available energy commodities.

Scientists and others have tried for years to convince Congress and several administrations of the coming energy problem with its economic and technical aspects. Short-sightedness on the part of many elected officials did not and cannot provide solutions to this matter.

The current energy crisis is, in essence, a crisis of economics, management, and politics.

Energy Conservation and Conversion Efficiency—Some Current Research Efforts. William Fulkerson, Oak Ridge National Laboratory (15 min.)

Current Research, Development and Demonstration work at ORNL is in the areas of reducing energy use in buildings and improved energy conversion efficiency is described. The need for fuel conservation and improved efficiency is established in the context of the national energy problem of converting from non-renewable fossil fuels of limited availability to coal and ultimately to inexhaustible energy sources. Conservation research at ORNL in the residential and commercial sector includes:

1) Studies of the relative savings in money and fuel from increased insulation in buildings as a function of geographical area.
2) Estimation of the fuel savings from night thermostat setback also as a function of geographical area.
3) Comparisons of the coefficient of performance of air-conditioners from various manufacturers.
4) Indentification of ways to improve the efficiency of gas furnaces, hot water heaters and mobile homes by both design and installation changes.
5) The development and demonstration of the Annual Cycle Energy System, a heat pump-energy storage system, which can reduce electrical energy use in heating, air-conditioning and hot water heating by 50% or more over conventional systems including air-to-air heat pump systems.

Work on conversion efficiency involves: (1) studies of Modular Integrated Utility Systems (MIUS) which are total energy systems for small communities or apartment complexes; (2) development of a coal-fired fluidized bed closed cycle gas turbine to power a MIUS; and (3) development of a potassium vapor topping cycle for central power stations.


A major energy policy reassessment is underway in our society. We as a people must reexamine our patterns of energy use. The problems are not all technological—many are legal, economic or social. We must eventually arrive at a steady state with respect to energy flow, the level of which will most probably be a function of our solar energy income.

All areas of our social institutions must be reexamined in terms of energy efficiency. We must begin to reduce our population, not through disease or death, but by working toward a consistently lower birth rate. We must reverse recent land use trends. We must revitalize mass transit systems as the private automobile is phased out. We must encourage the selection of the most energy efficient means of transporting goods. We must integrate the modes of transport.

Architects must rethink our buildings—with more attention to site, insulation, reduced lighting, improved space heating and cooling. We must improve industrial designs—by eliminating "planned obsolescence" and planning for material recycle and reuse.

We must also alter our energy intensive agricultural practices; perhaps by returning to "organic" fertilizers. We must increase production of natural fibers, and eliminate some uses of synthetics. We must eliminate the enormous energy expenditures in processing and packaging.

Scientists have a unique role in guiding our society toward a zero energy growth society—as advisors to government and as educators.

Critical Mass: Energy for Every Man. Jacque Srouji (20 min.)

America no longer enjoys the luxury of a rural society. We are an industrial one and as such, can no longer employ the 'sticks and stones' mentality in dealing with 20th century technology.

In fact, there seems to be an almost anti-scientific crusade raging throughout the country. Combine this with seemingly deliberate distortions on the part of much of the news media plus a power struggle for the minds of the people on the part of a "fundamentalist intelligensia" and you have what we've got—a MESS that's about ready to achieve criticality. The author has found several moods prevalent today:

• You have the average person who thinks that he's too dumb to understand anything beyond the world series or prime time football and acts accordingly.
• You have the professional crusader who acts like a bull (or a cow) in a China shop when it comes to saving the world.
• You have the scientist who shuts himself in an ivory tower and suffers from the 'god' complex.

Finally, you have the scientist who is not satisfied with test tubes and statistics and feels a need to be needed. He and only he is going to lead the Children of Israel to the Promised Land. . . .

These facts are worth considering:

• Dependence on foreign energy sources is simply no longer a stable factor from both a security standpoint as well as economic. Further defined, it means that when the chips are way, way down, no one is going to help America but the Americans. Let's start acting accordingly. . . .

• More than 75% of the nation's energy consumption is based on petroleum and natural gas. Domestic supplies of these are dwindling.
• Coal, the most abundant domestic fossil fuel provides less than 20% of current energy needs.
• Uranium, the domestic energy source with the greatest energy potential provides about 2% of the nation's energy.
• Solar and Fusion—GREAT for the year 2000 but what about now. The question is how do we get from the here and now to the then and there. The answer is that we utilize the cheapest thing going for the next thirty or so years and somehow manage to squeeze by that boulder blocking our path.
Solar Energy—Can The Algae Help? Dr. Larry W. Jones, University of Wisconsin (15 min.)

The efficacy of the use of photosynthetic organisms for the conversion of sunlight to usable chemical energy depends to a large extent upon which product of photosynthesis is accumulated. The most advantageous product would be hydrogen gas and produced directly from the photosynthesis of water into oxygen and hydrogen without water loss. We have looked at the green and blue-green algae as possible sources of photosynthetically produced hydrogen.

The green algae have long been known to produce hydrogen gas in the light. But as yet no one has been able to overcome the problem of oxygen-sensitivity of the enzyme (photosystem) involved in the process, and this limits the possibility of producing hydrogen from green algae. Even blue-green algae are capable of producing hydrogen gas at low light intensities, but the blue-green algae are phototoxic to marine creatures and have not been found to produce hydrogen gas at low light intensities. Nevertheless, these algae are potentially valuable as sources of hydrogen gas if they could be grown under conditions of controlled light and temperature.

Numerical Analyses of Selected Red Oak Populations. Richard J. Jensen, Wright State University, Dayton, Ohio (20 min.)

Three hybrid-planting combinations of 'Jonathan' sycamore, 'Peyton-hamilton' red oaks, and 'Flambeau' red oaks were examined by cluster analysis and principal component analysis. The populations sampled were from New Jersey, Michigan, Louisiana, and Tennessee. All populations are of relatively recent introduction and have not been exposed to the environment in which they might be maintained in an agroecosystem. These species of blue-green algae have been shown to be capable of producing hydrogen gas at relatively high rates without long periods of hibernation. However, because of the high light intensity required, they may not be suitable for large scale production facilities. Nevertheless, these algae are feasible for the undeveloped countries.

Extraction of Food Protein From Hematodromia pachyneura (Hemiptera: Coreidae) and Camalotes vatana (Hemiptera: Coreidae). Robert T. Davis, University of Tennessee—Knoxville (30 min.)

Food processing requires twice as much energy as production agriculture. One of the more intense energy operations in food processing is the production of meats. The experiments performed to determine whether or not a large-scale industrial processing of meats could be economically efficient than normal small-extraction protein extraction. The use of ultrasonic energy increased protein extraction from sawdust. The energy was found to be effective in releasing proteins from the cells and increasing the efficiency of protein extraction. The results of these experiments were that sawdust can be used as a protein source for meat production.

Carboxylate Content of A. auriculatus J. M. W. Thomas, Thomas R. Borrell and Robert Thornburgh, The University of Tennessee at Martin (15 min.)

The project involved studying the interactions of A. auriculatus with the white (or sand) Forma. The general objective of the project was to determine the significance of the interactions on the biology and ecology of the species. The project was aimed at understanding the interactions of the two species on their natural habitat and the effects of these interactions on the overall ecosystem.

Regional Global Radiative Forcing. B. M. Fram, General Electric, Kirtland AFB, Ohio (15 min.)

Global climate change is a major concern for the future of humanity. This study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment.

Climatic changes are important for the understanding of the relationship between climate and the environment. This study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment. The study examines the potential impacts of global warming on the economy, society, and the environment.

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V. R. R. Uppulur, Chairman

Asymptomatic Theorems for a Second Order Differential Equation: The Finite Diagonal Cycles, B. M. Sakurman, East Tennessee State University (10 min.)

The minimum conditions for the equation by which the asymptotic behavior of the solutions can be determined are given as:

\[ y(x) = p(x) \left[ \int q(x) \, dx + C \right] \]

where \( p(x) \) and \( q(x) \) are functions of \( x \) and \( C \) is a constant of integration.

The asymptotic behavior of the solutions can be described as follows:

1. If \( p(x) > 0 \) and \( q(x) > 0 \), then the solutions approach zero as \( x \to \infty \).
2. If \( p(x) < 0 \) and \( q(x) > 0 \), then the solutions approach a finite limit as \( x \to \infty \).
3. If \( p(x) < 0 \) and \( q(x) < 0 \), then the solutions approach infinity as \( x \to \infty \).

The asymptotic behavior of the solutions can be determined using the following steps:

1. Compute the coefficients \( p(x) \) and \( q(x) \) for the given equation.
2. Determine the sign of the coefficients for different values of \( x \).
3. Use the asymptotic behavior chart to determine the behavior of the solutions.

MEDICAL SCIENCES SECTION

James W. Wilson, Chairman

You Learn... A Cooperative Effort in Medical Education. Joel G. Zachary, M.D., Veteran's Administration Central Tennessee (10 min.)

In any discipline there exists a need for practical experience as well as academic expertise if effective teaching is to be accomplished. Recognizing the need of off-campus nursing students and the necessity of instructor knowledge of hospital problems, the University of Tennessee and the St. Thomas Hospital, Nashville, have launched a joint program in medical education. This program involves the use of hospital facilities for the education of nursing students. The program is designed to provide the nursing students with the necessary clinical experience. The program was initiated as a result of a cooperative effort between the two institutions, and it has been successful in meeting the needs of both parties involved.

4.8 L FT: This immunopotentiation treatment, one prior day to primary antigen stimulation, only slightly altered the clinical response in patients with hypereosinophilia and sarcoidosis treated with greater antioxidant synthesis than either 0.4 or 0.8 L FT in resus- citated with the use of cell-sensitized donors. Elevating FT dosage increased the immunological response, indicating the need for additional research. The study was designed to evaluate the effects of immunopotentiation treatment on the clinical response of patients with hypereosinophilia and sarcoidosis.

The Disease of Incidence of Sudden Infant Death Syndrome, J. M. Mason, and J. T. Francisco, University of Tennessee Center for the Health Sciences, Tennessee (10 min.)

The incidence of cases of sudden infant death syndrome (SIDS) in Shelby County, Tennessee, has fallen from over 100 cases per 100,000 live births in the early 1960s to 5 cases per 100,000 live births in the late 1970s. The effects of declining birth rate and reduced infant mortality in the past 10 years do not fully account for the decreased incidence of SIDS. When these data are analyzed separately into white and non-white groups, it is observed that the reduction in SIDS is greater in the non-white population. Thus, the risk of SIDS in non-white infants, with a factor of about 2, appears to have practically disappeared.

Pathologic Changes During Mast Cell Degranulation, James W. Wall, Virginia Commonwealth University, Richmond, Virginia (25 min.)

Electron microscopic studies of intestinal mast cells in the lungs of dogs exposed to 2 hours of hemorrhagic shock, injection of 0.15 mg of purified Diclofenac sodium trihydrate solution, and dogs treated with Compound 48/80 all show a similar morphological degeneration of the cell with significant changes compared to the same cells from control animals. All these changes of cells showed changes in capillary permeability with marked interstitial edema. This has been well documented in hemorrhagic shock. From biopsy specimens undergoing cardiopulmonary bypass procedures, which has been done in the dogs. Pre- and post-pump biopsy samples were compared. From the pre- and post-pump samples, showed significant changes in the morphological indicators. The histopathological changes known to be stored in these mast cell granules. This evidence suggests that mast cells mediate a limitation of capillary permeability in all of these situations.

PHYSICS AND ASTRONOMY SECTION

Robert S. McDow, Chairman

Research in Molecular Spectroscopy at Fisk University, E. Silber- berg, Fisk University, Nashville, Tennessee (10 min.)

The Molecular Spectroscopy Laboratory at Fisk University carries out research in the field of molecular spectroscopy. The equipment consists of high-resolution spectrophotometer, a Fourier transform spectrophotometer, and a collection of sampling accessories including high vacuum, high temperature, and low temperature cryostats. The laboratory is equipped with the vibrational spectroscopy instrumentation which is used to study the vibrational modes of a molecule. The laboratory is equipped with the molecular spectroscopy instrumentation which is used to study the vibrational modes of a molecule.

Antigen Dose Alteration of Actioncymen D and Radiation Induced Myelosuppression, M. I. Mason, University of Tennessee Center for the Health Sciences, Memphis, Tennessee (10 min.)

Four ug actioncymen D and 100 u radiation in combination were studied to determine the effects of antigen dose alteration on radiation induced myelosuppression. The study was designed to evaluate the effects of antigen dose alteration on radiation induced myelosuppression. The study was designed to evaluate the effects of antigen dose alteration on radiation induced myelosuppression.

Report on the Conference on Coordination in Physics. Robert S. McDow, Chairman

A conference was held at Illinois Institute of Technology for the purpose of bringing together physicists from different parts of the country, to focus on a collection of courses at the upper division level that emphasizes coordination. The conference was designed to serve as a forum for the presentation of papers and the discussion of issues related to the coordination of education in the sciences and the arts. The conference was attended by physicists from different parts of the country, and it was successful in stimulating the discussion of issues related to the coordination of education in the sciences and the arts.
The Energy-Environment Simulator. John C. Cärs, Austin Peay State University (15 min.)

The Energy-Environment Simulator is a computer-game type that provides a hands-on approach to showing students the trade-offs in performing different energy-related tasks and making the decisions that will affect these trade-offs. The simulator will be used to communicate a greater awareness of the environmental and related energy environment in the community. The concentration and action of the simulator will be to make a user actively control the path of the game. Five groups of players will be used to simulate the game so that all the game can be theoretically controlled to save the world.
ZOOLOGY SECTION

SECTION I

Michael L. Kennedy, Chairman

Changes in Nitrogen and Phosphorus Concentrations in Rain-Og Water from Barnyards. James A. Campbell & Gladys Mayres, Tennessee State University. (15 min.)

The concentrations of total and water-soluble nitrogen and phosphorus occur in a range of concentrations, which differ depending on soil type and location. The data are being collected in the laboratory, in the community, and this approach has been a successful tool for quantifying nutrient concentrations in science and mathematics at Loretto High.

The Revival of Science Fair in Montgomery County. Milledge B. Perry, Clarksville High School, 300 East Court, Clarksville, Tennessee (15 min.)

For students are more interested in science educators than the subject of Science Fair. Do the kids do the projects by choice? What happens when class work when preparing for a Science Fair? Is this really science, representative of what science is? The Clarksville High School Science Department considered these questions and planned for the science fair this spring, and we hope it will be the greatest success our past two years have experienced.

One Earth For All: Treat It With Respect. J. W. Clark, Oak Hill High School, Davidson County Schools (15 min.)

The Urbana 91st Gathering of the teachers working together to develop a comprehensive environmental program for Urbana 91st. The group of 100 interested cardholders was one facet of the multi-media program developed to enhance community interest in improving and protecting our environment.

Each card in the kit states a behavioral objective and activities to achieve it. This approach is also being used in science clubs, or mimeo cards in any course of study for a short or extended program.

General Objectives:
1. To identify major problems in today's environment.
2. To lead people to become more aware of our limited resources.
3. To stimulate interest and action in improving the environment by developing pollution programs.
4. To lead people to face our energy crisis and to explore alternative energy possibilities.
5. To increase awareness of the relationship of the environment to life styles.

Teaching Science in the Inner City, M. A. Costing, Davidson Co. Public Schools, Cumberland Junior High (15 min.)

The special problems of teaching science in a highly urbanized community. The issues are made more complex by membership in minority groups. Children of these groups are attending school more often than any other age group. And that's difficult for the same reasons. In terms of their structure; the congestion surrounding them forms an extremely difficult environment for teaching science.

Our concept of pastoral America is largely outdated. It is necessary to develop real meeting the environmental problems of the changing world is a large dilemma.

Teachers working in these communities must exhibit special understanding and acceptance of the urban minority groups. Most of these students have been told by others that they are "less".

Specifically, what must a science teacher do in order to be a "second culture citizen". How can the science teacher explore the prejudices necessary to modify his or her own educational curriculum?

Some of these include value clarification, humanistic, educational, and ethnocentric activities that have shown effective in teaching the inner city student.

ZOOLOGY SECTION

SECTION II

O. Ray Jordan, Chairman

Conventional Biotinylation and Trace Biotinylation of Zinc Cyanide, Sodium Cyanide, and Malachite Green. C. A. Brown and A. A. Frommer, University of Missouri. (20 min.)

Extensive experiments with malachite, zinc cyanide and sodium cyanide have been done. Both of these chemical use excellent and repressive method have been completed. The repressive tests have been conducted with carbon, and cyanide carrier homogeneity, and mass concentration of the chemical samples. More data and graphic results are being presented.

A Comparison of Electrochemical Banding Patterns Observed for Proteins from Two Species of the Genus Drosophila. Thomas E. Byrne and John W. Harris, Tennessee Technological University (20 min.)

Polyacrylamide gel electrophoresis was used for the taxonomic comparison of leucine dehydrogenase, esterase, and general muscle protein bands. The results show that both species exhibit the same taxonomic bands. In addition, more bands were observed for D. melanojannus (zebra) in the two species. Both species were collected in Central Hill, and the members of the TNES. The two species are exactly the same for the general muscle protein bands. No difference in quality of internal and external dehydrogenases. No, no sex or age differences were noted. The similarity of the electrophoretic banding patterns observed for these two species lends support to the hypothesis that hybridization can occur between them.

Inheritance of Hemoglobin Synthesis in the Cotton Ball Weevil (Anthonomus grandis Boh.). Charles J. Biggs and Harold R. Bancroft, Memphis State University (15 min.)

Four extant regions in the arctic zone of western African Weevil were determined by vertical polyacrylamide gel electrophoresis. They were described E. A. 5, and in or in out migration. The inheritance pattern for extant II was determined. The cotton ball weevil suggests that the extant regions in this are controlled by a pair of autosomal codominant alleles.

Notes on the Significance of Eye Pattern as a Systematic Character. Charles D. Price and T. E. Goodwin, Memphis State University (15 min.)

This study includes an in-depth examination of the eye pupil