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Wisconsin Academy Review

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COVER STORY

The peaceful rolling hills of a southern Wisconsin farm characterize the many places of simple beauty which exist in our State. All too often we do not take time in our busy life to contemplate the beauty of simple, everyday surroundings. Instead, we seek spectacular settings often several hundred miles away. The farm pictured on the cover is located in the Town of Exeter (Green Co.) about 5 miles southeast of New Glarus.

Mr. Phillips' poem "Wanderlust" which appears on the back cover exemplifies the desire many of us have to get away from it all for a few hours. Although the poem and the cover photo are not directly related they both impart the feelings which can be gained by taking time to appreciate simple beauty.

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NEW MEMBERS . . . . . Inside Back Cover

Editorial

Yes, another combined issue of the Review - and plenty of reading material. Admittedly the directory issue contained only material relating directly to Academy affairs, but it was felt the material was sufficiently important to merit an entire issue. This issue (excluding the special supplement) is what you can expect in the future. We hope to be able to maintain a balance among the sciences, arts and letters with respect to feature articles, but we suspect this will not always be possible. We would very much appreciate suggestions and/or contributions from those of you in the humanities. In the next issue we will be printing an article explaining the Academy's publication policy with respect to the TRANSACTIONS and the Review. This will serve as a guide for those of you who are in doubt as to which publication you should submit your manuscript.

The 1963-64 Annual Review of the Wisconsin Junior Academy of Science, which appears as a special supplement of this issue, represents a comprehensive summary of activities for the past academic year. The Junior Academy program, initiated by the Academy in 1944, represents one of the most important programs launched by the Academy and now co-sponsored by the UW. The supplement is included in this issue to keep you informed of this worthy Academy program.

On pages 23 and 24 you will find information about joining the Academy as well as an application form. We hope that you will give this form to one of your friends or associates. Check the membership directory to see which of your associates are not members.

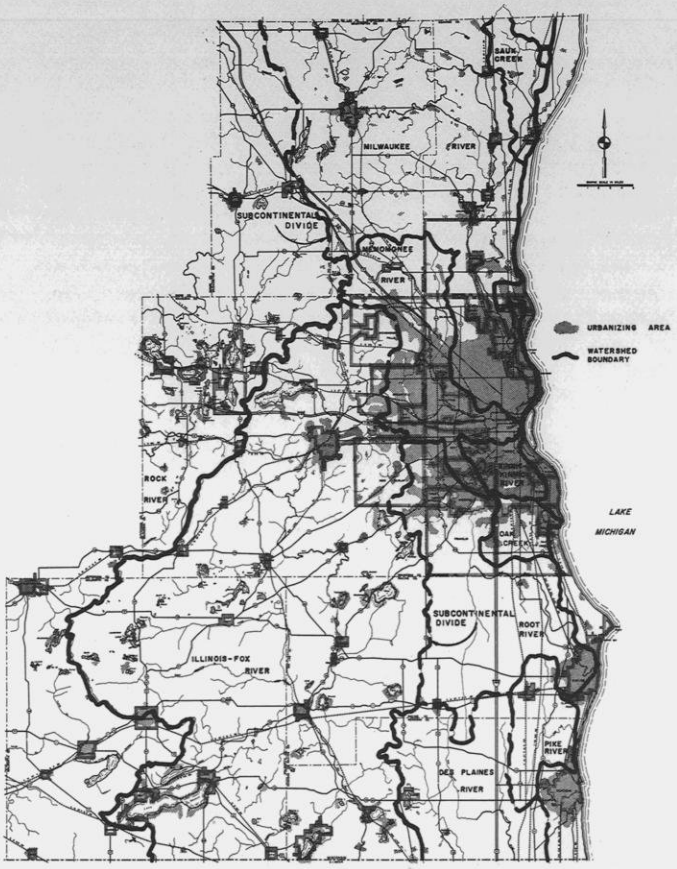
For your convenience and information we are again listing our publication schedule for the Review to act as a guideline for those of you who may wish to contribute to the Review:

Issue	Copy Deadline	Publication Date
Fall	Sept. 15	Oct. 25
Winter	Dec. 15	Jan. 25
Spring	Mar. 15	April 25
Summer	June 15	July 25

Regional Planning in Southeastern Wisconsin

by Kurt W. Bauer

Figure 1



NEED FOR REGIONAL PLANNING

Twenty years ago there was probably only one multi-county regional planning agency in the entire United States. Today there are 39 such multi-county regional planning agencies, three being located within the State of Wisconsin alone. These regional planning commissions have taken shape throughout the country as a necessary response to the problems of areawide urbanization. Under the effects of such urbanization, entire regions are becoming mixed rural-urban areas creating new and intensified development problems of an unprecedented scale and complexity.

The problem of providing economically feasible facilities for importing, diverting, and transporting potable water, sewage, and storm water drainage; for safe and rapid surface transportation; and for controlling the pollution of streams, lakes, ground water and air for such urban regions will tax our existing technology to its limits. The problem of adjusting urban growth and development to the resource base, of preserving land to meet the park and open space requirements of a rapidly growing urban population, and of creating better regional settlement patterns will similarly tax our administrative and legislative ingenuity to its limits. The problems are so great and the needs so many that only comprehensive areawide planning can provide the framework within which these problems can be solved and these needs can be met.

REGIONAL PLANNING CONCEPT IN SOUTHEASTERN WISCONSIN

The Southeastern Wisconsin Regional Planning Commission represents an attempt to provide such comprehensive areawide planning services for one of the nation's large urbanizing regions on a voluntary cooperative basis. The Region comprises the seven counties of Kenosha, Racine, Milwaukee, Ozaukee, Washington, Waukesha, and Walworth and constitutes a total area of 2689 square miles or about 5 percent of the state's total area. About 40 percent (1.6 million) of the state's

population, however, resides within this region which contains three of the State's 5 1/2 Standard Metropolitan Statistical Areas. The Region contains approximately one-half of all the tangible wealth in the state and from 1950 to 1960 accounted for 64 percent of the total population increase of the entire state. It represents the state's greatest wealth producing area and generates far more in state taxes than it received in state services.

The seven county Region contains 11 major drainage basins ranging in size from 26 to 926 square miles, at least nine of which will be seriously affected by the urban expansion of the Region's three urbanized areas (See Figure 1). A subcontinental divide crosses the Region in a northwesterly-southeasterly direction imposing severe constraints upon the range of feasible solutions to water related resource based development problems.

The Commission was created under state enabling legislation upon the unanimous petition of the seven county boards. It consists of 21 citizen members, 3 from each of the 7 counties, one Commissioner from each county being appointed by the county board and two from each county being appointed by the Governor. The Commission in turn employs a basic planning staff of ten people supplemented by additional staff according to program needs. Such supplementary staff stood at 240 in June of 1963 and at 50 in September of 1964. In addition, consultants are employed from time to time.

FINANCING

Basic funds necessary to support the Commission's operations are provided by the member counties, the costs being proportioned among the counties on the basis of relative equalized assessed valuation. Local funds are supplemented by state and federal funds for specific work programs.

FUNCTIONS

The Commission is charged by statute with the function and duty of "making and adopting a master plan for the physical development of the Region." The permissible scope and content of this plan as outlined in the statutes is extremely broad and extends to all phases of regional development. The plan is, however, completely advisory and is intended to serve as a basis for the extension of assistance and advice to the various levels and agencies of government functioning within the Region.

The areawide problems necessitating a regional planning effort in southeastern Wisconsin all have their source in the Region's unprecedented population growth and urbanization. These areawide problems include among others: drainage and flood control, water supply and pollution, sewerage and sewage disposal, park and open space reservation, economic development, and transportation.

INITIAL WORK PROGRAM

Reliable planning and engineering data collected on a uniform areawide basis is absolutely essential to the formulation of workable regional development plans. Such data was virtually nonexistent at the time of the creation of the Commission. The initial work program of the Commission was, therefore, directed toward basic data collection and included six basic regional planning studies initiated in July 1961, and completed in July 1963:

1. Statistical Program and Data Processing Study

Effective planning is increasingly dependent upon the collection and interpretation of current and historical statistical data covering a complex variety of physical and social factors. A well-defined and continuing program for collecting and processing basic planning and engineering data is, therefore, needed for adequate comprehension of complex regional relationships and evaluation of alternative development patterns. The primary objective of the statistical program and data processing study, therefore, was to develop the basic framework of an information system for regional planning. The framework used in the development of this information system was a series of mathematical simulation models. These models serve to define requirements for future data collection and analysis programs and establish a logical and detailed set of data requirements consistent with the application involved. In addition, the models when further developed and refined provide a means for quantitative testing and evaluating the feasibility of alternative plans.

2. Base Mapping Program

Good base maps are essential to any planning program, and the primary objective of the regional base mapping program was to provide a means of recording in a permanently useful form a great deal of information about the natural and man-made features of the Region. The commission's base mapping program resulted in the preparation of a unique and highly versatile series of regional base maps in a choice of scales ranging from 1:24000 to 1:500000 and in a choice of sizes ranging from 7 by 9 foot wall maps to 8 1/2 by 11 inch hand maps. The various map sheets can be combined to depict in its entirety any natural or rational planning area within the Region, such as a watershed, a commutershed, a special purpose district, or a group of communities. The base mapping program provided the first true maps which accurately portray all the counties within the Region at a uniform scale and upon which distances and areas can be accurately measured.

3. Economic Base and Structure Study

This study was intended to provide a basis for an understanding of the Region's economic base and structure. Such an understanding is essential, not only to the preparation of practical and workable long-range plans for the physical development of the Region, but to any development program which might attempt to strengthen the Region's economy. This study analyzed the growth tendencies, strengths, and weaknesses of the Region's mature economic core and causative factors in the growth or decline of important economic activities. The study includes employment forecasts to 1985, and these are expanded to obtain total population levels which could be supported by the forecast employed labor force. The study also provides data and analyses of such important economic indicators as labor force, disposal income, retail sales, and wage rates.

4. Population Study

This study provides information on three basic aspects of the Region's population: size, composition, and spatial distribution. The study includes analyses of birth rates, death rates, net migration rates, gross density patterns, educational attainment, marital status, family size, age and sex composition, race and nativity as well as sheer population size. Population projections are prepared to 1985. The results of the study are useful to county and local as well as regional planning efforts since the population projections provide a suitable basis for local projections by the ratio method.

5. Natural Resources and Environmental Problems Study

Sound regional planning must concern itself with the probelms of adjusting urban growth to the underlying natural resource base; and specific data concerning that base is, therefore, essential. Topics covered in the study include historic resource patterns, climate and weather, geography, mineral and nonmetal resources, forests, soils, air, surface and ground water, flooding, fish and wildlife, and recreation and open space.

6. Public Utilities Study

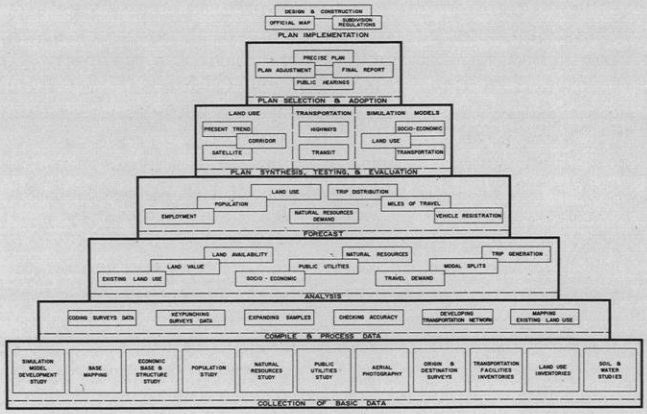
Urban development today is highly dependent upon the utility facilities which serve the individual land uses with power, light, heat, water, and sewerage. How well a region can sustain urban development will, therefore, depend to a considerable extent upon the location and capacity of these facilities. Moreover, certain of these utility facilities are closely linked to the surface and ground water resources of the Region, and therefore, greatly affect the overall quality of the environment. The study provided a basic physical inventory of the various utility systems serving the Region, data on their existing and probable future service areas, and on their capacity to absorb new urban growth.

REGIONAL LAND USE-TRANSPORTATION STUDY

All of the foregoing studies were directed toward providing a basic foundation of planning and engineering data for regional planning and were documented in published reports. None of these studies involved the actual preparation of plans. The first work program actually directed toward the preparation of long-range development plans to be undertaken by the Commission is a regional land use-transportation study. This study is a cooperative undertaking of the U. S. Bureau of Public Roads, the State Highway Commission of Wisconsin, the Housing and Home Finance Agency, and, representing the local units of government, the Regional Planning Commission. The objective of the study is to produce two of the key elements of a comprehensive plan for the physical development of the Region: a land use plan and a transportation plan. In addition to providing for the collection of data necessary to an analysis of the Region's transportation problems in great depth, thereby permitting the sound planning, design, construction, operation, and maintance of highway and transit facilities throughout the Region, the study will also provide much valuable information required for solving drainage and flood control, sewerage and water supply, land and water use, and other resource related problems.

The study is comprised of six major phases: collection of basic data; compilation and processing of basic data; analysis; forecast; plan synthesis, testing, and evaluation; and plan selection and adoption (See Figure 2). The first year of the study has been devoted entirely to the first two phases. Major work elements completed to date include: the completion of up-to-date aerial photography of the entire Region, completion of the origin and destination studies necessary to determine existing travel habits and patterns within the Region, and an existing land use study. Also begun was a regional soil survey, a regional park and open space inventory, and a regional water quality study. The final plans are to be ready by July of 1966.

Figure 2
Major Phases of the Land Use - Transportation Study



A unique feature of the land use-transportation planning program is the extent to which federal, state, and local governmental agencies have been asked to participate in the preparation of the regional plans. Of particular interest is the fact that the program includes provision for three advisory committees of federal, state and local officials - technical, executive and legislative - as an integral part of the study organization:

1. An intergovernmental coordinating committee
2. A citizens advisory committee
3. A technical coordinating committee

In addition the U. S. Bureau of Public Roads, the State Highway Commission of Wisconsin, the Wisconsin Conservation Commission, Milwaukee County and the City of Milwaukee have all assigned planning personnel to the Commission's staff for the duration of the study, thus providing an unprecedented opportunity for the preparation of land use-transportation plans that can be cooperatively adopted and jointly implemented by all levels and agencies of government within the Region.

RESOURCES PLANNING

The Commission's planning program also embodies a recognition of watershed problems; and the Commission has to date formed two watershed committees: the Root River Watershed Committee and the Fox River Watershed Committee. The creation of these committees recognizes the need to consider watersheds as rational resource planning units if workable solutions are to be found to such related problems as land and water use, drainage and flood control, water quality

and stream pollution, and recreation and public open space reservation. Membership on the watershed committees is representative of local officials possessing broad experience in the various facets of watershed planning and land use development. The first comprehensive watershed planning program was initiated by the Commission in July, 1964 for the Root River watershed. It includes the major work items shown in Figure 3, and a comprehensive watershed plan including proposals for land use and water control facility development is to be completed by July 1966.

COMMUNITY ASSISTANCE

The Commission also extends planning assistance and advice to the local communities upon request. This assistance and advice takes various and diverse forms, ranging from the provision of planning and engineering data from the Commission's files to the preparation of special studies made in response to requests for specific assistance. As a part of this work, the Regional Planning Commission has prepared local planning guides on the subjects of: land subdivision, official mapping, zoning and the organization of local planning agencies. These guides all contain model ordinances and are intended to assist local officials in their day-to-day planning and engineering tasks.

SUMMARY AND CONCLUSIONS

The need for regional planning has been brought about by certain important social and technological innovations of our time. Most of these innovations are only at their beginning. They are resulting in the creation of many severe areawide environmental problems, problems which will require careful study of our environment for solution.

Officials and citizens who are daily involved in such areawide problems have come to realize that these problems can only be resolved within a framework of regional research and analysis. Within this context, regional planning has three principal functions:

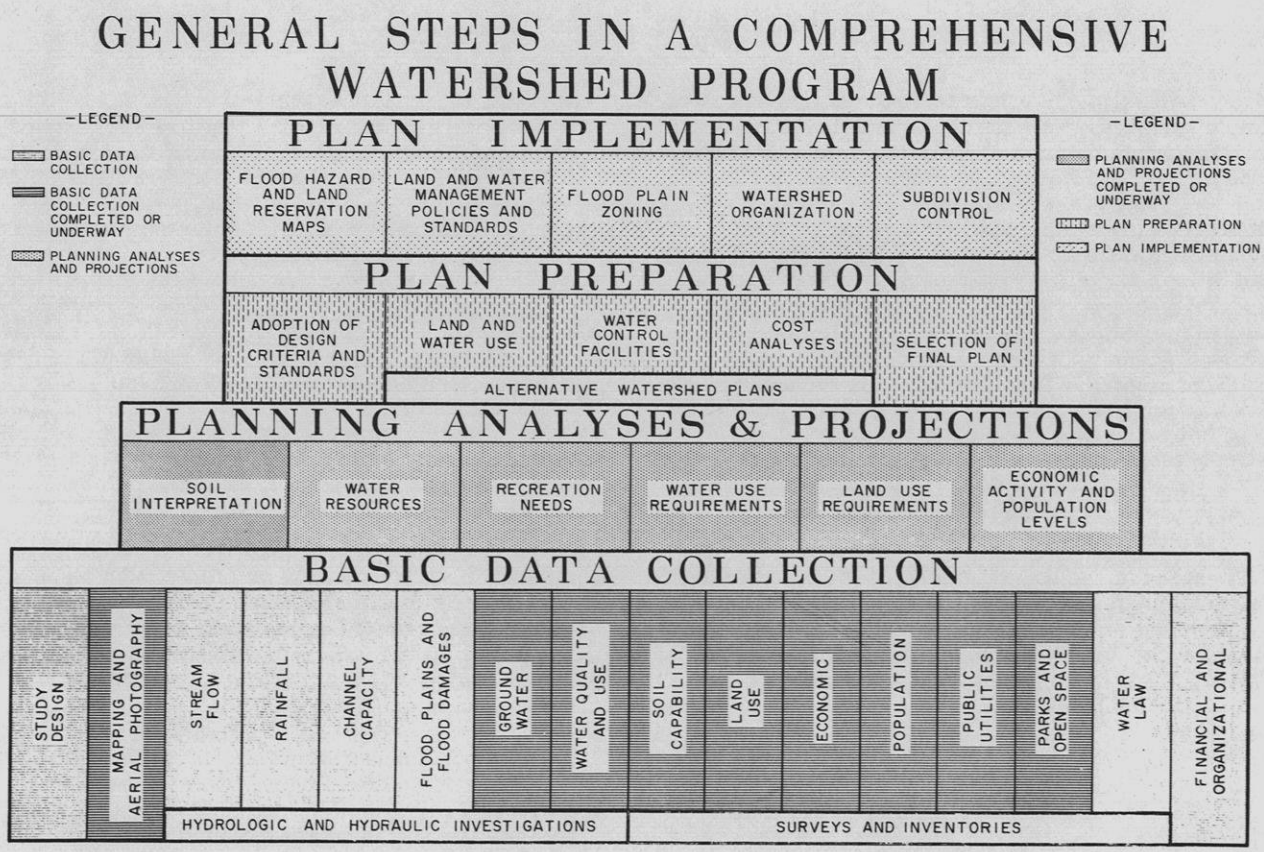
1. Areawide research; i.e., the collection, analysis, and dissemination of basic planning and engineering data on a uniform, areawide basis; so that, in light of such data, the various levels and agencies of government, private enterprise, and citizens' groups concerned can better make decisions concerning community development.

2. Preparation of long-range plans for the physical development of the Region; these plans being limited to those functional elements having regional significance; e.g., regional trafficways, regional storm water drainage channels, regional park and open space reservations.

3. Provision of a center for the coordination of the planning and plan implementation activities of the various levels and agencies of government operating within the Region.

No one should under estimate the enormity of these tasks or the importance of their successful conclusion to society.

Figure 3



Gays Mills flood, spring 1961. Photo courtesy of the UW Dept. of Ag. Journ.

Four years ago, in order to find out the extent of personal and family losses sustained from floods in America, I wrote to the American Red Cross for information. The Director of Research of that institution sent me a listing of the total expenditures by states each year for the ten year period 1948 to 1958. During this ten year period the 48 States and Alaska received sixty (60) million dollars for flood relief. Money down the drain. The States of Kansas, Connecticut, California, Pennsylvania and Kentucky in the order listed received the largest amounts of money. During this same period Wisconsin received $125,727.00. In Wisconsin our floods are relatively cheap floods accompanied by little loss of life. We have flash floods, catastrophic floods and floods that are of relatively short duration. Yet we do have floods and we do have flood losses and we can take steps now to effectively deal with them.

It must be remembered that these American Red Cross funds were for the bare essentials - food, medicine, clothing and temporary housing and that other agencies - the Federal Government, State and Local Government and other private organizations (i.e.) Quakers and Salvation Army, also assisted in flood relief.

So much for the financial losses, there are other losses and other important aspects of this problem. Let me quote three statements by prominent and informed gentlemen.

(1) In a report to the Mayor and City Council of the City of Columbus, Ohio, John W. Alvord and Charles B. Burdick said (half a century ago) in 1913.

"It is very evident to every body who has studied flood problems . . . . that a large portion of the suffering, loss of life, destruction of property has come about through the encroachments by unthinking population upon the flood water channels of the rivers." Two years ago in spite of up stream dams Columbus had another flood. Six to eight feet of silt in basements.

(2) Peter Frab in the May, 1961 issue of the Readers Digest in an article entitled "Let's plan the damage out of floods" said:

"Our mounting losses are proof of the folly of building in the natural path of the flood waters."

(3) Allison Dunham in the University of Pennsylvania Law Review June, 1959 said:

"The demonstrated effectiveness of engineering works and the new emphasis on human adjustments to floods have led many to conclude that an approach preferable to that of large public expenditures is the use of police power to force human adjustment to floods so that flood losses will not continue to increase."

Wisconsin's Progress

(1) Four Wisconsin Counties have flood plain provisions in their County Zoning Ordinances, these are Milwaukee, Waukesha, Jefferson and Bayfield Counties.

(2) The special flood plain zoning subcommittee of

Planning for Flood Damage Prevention

by Walter A. Rowlands

the Natural Resources Committee of State Agencies caused to be prepared, through the help of County Highway Commissioners, a map of the flood plains of all the important rivers and streams in every County in Wisconsin.

(3) This Committee, as a result of many discussions and after conferring with A. J. Thelen, Executive Secretary of the Wisconsin County Boards Association, drafted an amendment to Wisconsin's County Zoning Law under which all Counties are required to have flood plain regulations by January 1, 1968. No action has yet been taken by the Legislature on this Bill #S133.

Wisconsin's Need

If the state is to propose local regulations to zone the flood plains after 1968 and if the counties and municipalities are to do a good job of zoning before 1968, then we and they need to know much more about the flood plains than we presently know.

(1) We need to know the kind of use that is now being made of the flood plains of our important rivers -- whether agricultural, forestry, recreational, residential, commercial, industrial or wildlife uses.

(2) We need to refine the maps of the important flood plains - their width, length, area, degree of slope, soil type and proximity to cities and villages and residential subdivisions. Maybe we should classify these as to the degree of hazard involved.

(3) We need to examine the incidence of flooding. How often does flooding occur - every five years, ten years or twenty years? What do we know about their severity, degree of property damage, amount of losses sustained? Are these floods principally spring floods, summer floods or fall floods? The relation between the flood season and the growing season is likewise important in agricultural crop production. Soil surveys of the flood plains will be most valuable in determining the type and kind of agricultural use of the flood plains.

(4) We need to classify the land in the flood plain for its best use. If, for instance, it is to be zoned against residential use and business and industry then what are the acceptable alternate uses for the land? They may be parks, playgrounds, ballfields, fairgrounds, certain types of crop production, forestry, recreation, wetlands, game fish or wildlife development. In addition special river front parks, special auto parking areas are possible in the flood plains in special seasons of the year.

(5) We need to know in general what is happening to other lands within the watershed and the intensity of use in neighboring built up areas. We also need to know the changes that have taken place in flood plain occupance during the past twenty to twenty-five years.

(6) We need in fact to develop a new philosophy about floods and flooding. A river consists of two parts, the main channel and the flood plain, and the flood plain is as much a part of the river as the main channel. Neither one should be encroached upon. In this area lived a man who had such a philosophy - His name, Charles B. Whitnall. He alone pioneered the idea of river valley development for parks and parkways. We need to do more of his kind of thinking and planning and doing and we need to extend it throughout all of Wisconsin. The logic of flood damage prevention is now gathering momentium in many states. This is good.

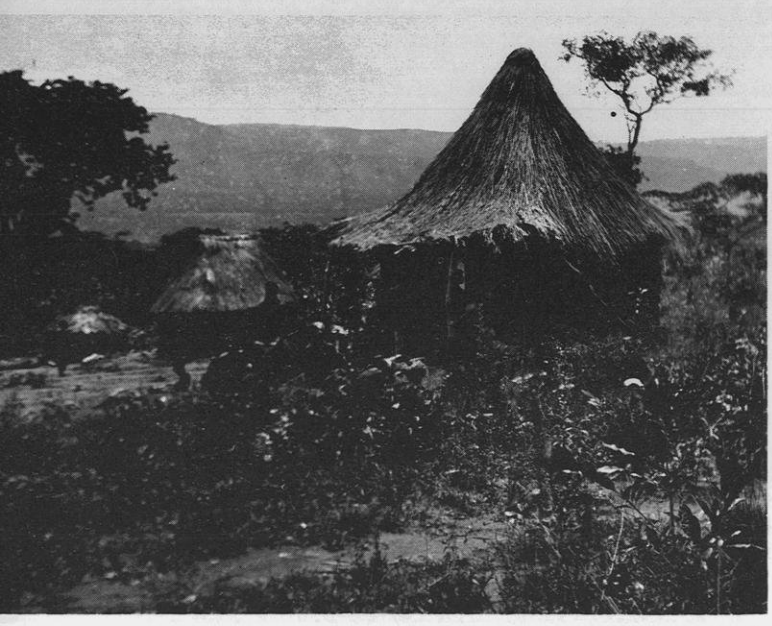
(7) And finally we need a great education program, vigorous and continuous, among all our citizens and local government officials to acquaint them with the facts and figures on their local flood problems of what can be done about floods. We need to do this job thoroughly and systematically. State and Federal and Regional agency personnel familiar with the basic problem, who know local situations and understand local people and their customs and traditions, can be of tremendous help in furthering the cause of flood protection and flood prevention. In this new educational effort it is obvious that flood plain zoning can be safely advocated as an economy measure. We should continue this educational program until all our citizens are fully acquainted and fully informed with the hazards, the danger, the expense, and the futility of locating homes in the path of the floods. Flood damage prevention according to General Vogel of TVA is as elementary and sensible as "coming in out of the rain".

As was said many years ago, "It is better to keep the people out of the path of the floods than to try to keep the floods out of the path of the people".

There is a great deal of unfinished business on the flood plains of a number of states and one of these states is Wisconsin. We have had floods ever since a fellow by the name of Noah built a ship called the Ark and will have them again and again but the degree of damage sustained can be substantially reduced if planning for flood protection is made a realistic part of every land use planning program in America. Progress in planning as in anything else is made by people who dare!

Excerpts from Merlin W. Ennis' Unpublished Preface to

UMBUNDU



Photographs courtesy of John L. Ennis

Anyone interested in folklore, comparative literature, the people of Africa, or even Wisconsin authors, will find Umbundu, Folk Tales from Angola (1), a rich source of material. A review in the American Anthropologist (2), however, while agreeing with this estimate, points out that the book is not as valuable as it should be because there is no preface giving students of anthropology the cultural background from which the stories spring.

The collector and translator of the stories, published in 1962 by the Beacon Press, is Merlin W. Ennis, born and reared in Endeavor, Wisconsin, a distinguished graduate of Beloit College in the class of 1900, and the special representative, under the American Board of Foreign Missions, of the First Congregational Church of Beloit in Angola, Africa, from 1904 to 1944 (3). Mr. Ennis is one of the rare United States citizens with an intimate knowledge of any native African culture. The translator of the New Testament into Umbundu, the language of a million and a half Bantu people, he thinks it unlikely that as many as 20 English speaking people could read the Umbundu texts of the folk tales (4). During his forty years as a missionary in Portuguese Angola, Mr. Ennis not only taught the people the Christian gospel, but founded schools and trained native leaders in better agriculture, better hygiene and sanitation, better homemaking, and in many crafts (such as brickmaking), to help them make a transition into the modern world. An amateur anthropologist and archaeologist since his college days, he was always a keen observer of the native culture (5). The justifiable criticism of his book for lacking a description of the life of the Ovimbundu is ironic, since he wrote the first draft of such a preface, only to have it rejected by the final editor (6).

Folk Tales from Angola

by Susan Welty

With the author's permission, I wish to give you a taste of his unpublished introduction. Even a small sample gives a better understanding of one of the cultures from which modern Africa must develop.

"First," says Mr. Ennis, "a few definitions: an Ochimbundu is a member of the race. Ovimbundu is the plural of Ochimbundu" (7). The book was named Umbundu by the publishers, more appropriately than they realized. "Umbundu [the language] has a linguistic device not known to our civilized languages. Using the stem of a noun with a U prefix, it indicates the non-physical characteristics of a people, person, animal, or bird. Consequently, here it names the culture and qualities of the Ovimbundu. It is also the name of the vehicle for communicating this culture - their language" (8).

The Ovimbundu, he tells us, occupy the Benguela plateau in Angola, Portuguese West Africa. Their ancestors, the Jaggas, apparently invaded the region in the late 1500's. They were raiders, probably from the East African highlands. Migrating through settled country, they attacked an unsuspecting village, killed the adults and kept the children to train for soldiers and soldiers' wives, settling down to live off what crops the land provided while they planned their next raid. About 1600, the Jaggas made contact with the Portuguese, and discovered that selling adult captives as slaves was much more profitable than killing them. When they came into the Benguela highlands, the Jaggas found that their raiding tactics did not work against the pastoral tribes there, who could take their flocks and retire into the desert, The Jaggas finally settled down, made terms with the wandering tribes, secured control of the trade routes between the interior and the sea, monopolizing the commerce in ivory and slaves. They were divided into ten independent kingdoms, but had the same language and culture.

Mr. Ennis discusses the villages of the Jaggas' descendents, the Ovimbundu, with their mud-and-thatch huts crowded inside a stockade; the clubhouse in which the life of the village men centered; the social separation of the sexes and the clearly defined work of each sex; the communal play ground or dance floor where the villagers celebrated festivals with songs, dances, and games; and the great importance of the family in the social system (9). Then, in his story of the ombala of Mbailundu, he illustrates many aspects of Ovimbundu life.

"The capital of a region was called ombala; the king resided there and it was the source of authority and power....This [ombala of Mbailundu] was built on a rocky cone rising some 300 feet from the level of the plateau and dropping off some 800 feet on the far side. This rock can be seen from almost any spot in the country of Mbailundu...

"One day a sekulu of the Mbailundu church and one of the first converts of the mission said to me. 'I, as a boy, lived with my grandmother at the ombala as her chore boy. She was the king's beer maker. Would you like to have me tell you about some of the ways of the ombaba?' Sekulu means 'elder' in Umbundu. It is a title of honor connoting 'elder statesman.' I knew that what the sekulu told me would be trustworthy.

"I was delighted to accept the offer and said, 'Let us go.' We went in a pick-up as far as one could go by car... It was a beautiful day and the distances stood out clearly. With one exception all traces of the houses of the old village had disappeared. The place had been shelled and burned by the Portuguese back in the 1890's.

As we picked our way up through the rock outcrops, I picked up a small glass bead with vivid red color.... [The sekulu] said that this was a much prized bead of the old days called dog's blood, and in those times would have purchased a slave.

"Two thirds of the way up the hill we came to a single tree growing by a large granite slab lying flat... The corner of the rock was some forty inches from the ground, and perhaps twice that distance from the osui tree... We stopped and I sat down on the corner of the stone slab nearest to the tree. The sekulu stood in the gap between the rock and the tree; standing there he said 'This is the place where they sacrificed the old man. The old man would be seated on the rock where you are sitting. The bull would be tied to this osui. The priest would stand where I am standing. He would have the sword in his hand... First he would stab the old man and then he would stab the bull. He would repeat this until both were dead. The carcasses would be carried up the hill and around behind that great rock. The meat would be cut up into small bits, and after it had been mingled would be cooked together in big pots. Later this would be served to the populace gathered for the purpose of taking part in this sacred ceremonial meal for which they had assembled.

"To the left of the rock on which I sat, there was a rock shelf some thirty to forty feet long. The sekulu pointed to this and said, 'While the sacrificial ceremonies were taking place, a chorus with drums would be standing there and singing to the beat of the drums while the sacrifice was being performed.'

"I had heard of this sacrifice, and understood that it was practiced in all of the kingdoms of the Ovimbundu. There is evidence that it was a part of the ceremonies connected with the installation of a new king. An old man in his dotage would be selected, treated well and fed well. When the day came they would fill him with strong drink until he was intoxicated. Then he would be sacrificed. The flesh of the man and of the animal would be cut into small pieces so that no one might recognize the source. This ceremony was supposed to unite the people into a common bond. Previously I had not understood that the flesh other than human was that of a bull This seems to link the ceremony to the customs of other countries and cultures. The Biblical 'calf' was actually a young bull.

"Leaving the place of sacrifice we spiraled up the hill to the left. On the south side, approaching the summit, we came to the place of the king's court. This was a sand covered shelf, flat and level, perhaps 25 by 60 feet. The sekulu pointed out a row of stone blocks at the western end... the seats for the king and his council. Slightly to the left side...were stones some four feet apart...the supports of the gate post of the entrance to the royal compound, the elombe. When the ombala was functioning there was a separate stockade enclosing the elombe. The stone...seats of the council were, as one faced the gate to the elombe, at the right hand side. The largest block...next to the gateway was the throne. The sekulu named the functionary that would sit on each of these stone seats. As I looked at them I could see a custom handed down from the old stone age... On the long north side of the court yard there was a stone seat for any accused person brought up for trial. To one side there was a seat for the prosecutor and on the other side another one for the defendant's counsel. Back of these seats there was a perpendicular rock wall some 25 feet high. On top of this ledge there was once a hut for the commander of the king's armed forces, hidden from sight by bushes. Between the king and the commander there was a tabu similar to that between a man and his mother-in-law. The king and his chief of staff might not meet face to face nor converse one with the other. With this [hut] arrangement it was possible for the military chief to audit all the proceedings of the court and to join in the discussions without breaking the tabu.

"The official kitchen of the kingdom was located at the far eastern end of the sand-covered court yard. The building had been burned... The fire place of three stones was all that was left... My guide told me that it was the custom when a new queen was installed to sacrifice an infant, and to bury the body under the official hearth. He supposed that under this one a skeleton reposed. Unless the queen sat in the doorway listening and acquiesced, no decision of the king and his council was valid. The official queen represented the women of the kingdom.

"Considering the way their political system was organized, the queen had a built-in control over the king and his policies. Among the Ovimbundu the kingship was not hereditary... from father to son. The kings were from the royal family. On the death of a king, a committee of leaders would choose some mature man with experience and sound judgement from the royal family. When he consented to take the position, he did it with the understanding that whenever the committee considered that he was no longer competent, they would remove him.

"When a king became incapacitated, the committee would strangle him with a bowstring and hang the corpse by the head from some projection within his house. While they were securing a successor the committee would announce that the king had a cold in his head and could not be out. When the body came loose and fell to the floor, the king was officially dead. The body would be buried in the sacred burial grove, and the head put in a box and put away in a cave where the heads of the departed kings were kept.

"When a king was installed, an official queen would be chosen to sit in the official kitchen of the ombala. They would choose a capable young woman who was not expected to have children, but would give her whole attention to affairs of the state. The queen had [great influence] for if she should decide that the king was becoming senile she would set fire to the official kitchen and go back to her village - an intimation that the king was likely to suffer from a cold in his head. As far as I have heard, the kings of the Ovimbundu did not wear crowns; their heads were uneasy enough as it was.

"From the court the sekulu took me through the royal grave yard... From the graves we came out on to an expanse of smooth flat ledge which must have been inside the royal enclosure. The sekulu pointed out to me a channel cut in the smooth, slightly sloping surface of the ledge... He told me that in the days of the king a small house had been built on this spot... the laboratory in which the medicines for the country were prepared. There were two rows of chairs facing each other along the walls of the interior. Corpses sat on these chairs. Part of his grandmother's routine

was to baste these corpses with rum every day. The juices coming from the cadavers ran off the surface of the rock and out under the door. When the process was completed the corpses became dry and mummified. The doctors of the royal society, in treating the sick, would take material from one of the mummies, from the part of the body corresponding to the site of the illness of the patient. The piece of mummy would be powdered and compounded into the cure. The system seems to have been homeopathic. I judge that the corpses were of both sexes.

"The hill on which the ombala was built looked conical from a distance, but actually the top was roughly flat, perhaps two acres in extent. Next we went out to the west side of the top where a sandy flat was partly covered with cubical blocks of stone lying side by side like a giant's plate of fudge. This was the place where the king and his councillors sat. Each cube was about two feet wide in all six directions. At one side were blocks of stone for the accused and for the lawyers. As a witch was a subversive and an enemy of society, one found guilty was executed and the body thrown down a chimmney-like cleft in the side of the hill.

"There was a stone cube standing at one side alone. This... was perhaps three feet on a side. The top had been carved by the wind into jagged points. I was told this was the testing place for crazy witches. A person judged to be a crazy witch was tested by being obliged to stay on this rock, naked, for perhaps three months. If in that time the person had not been bitten by a poisonous snake, caught by a lion, or struck by lightning, she was declared innocent.

"This ombala was operating in this way in 1885. Considered superficially, the things which I have described would justify the claim that the African is uncivilized, savage, and brutal. Actually they show nothing of the sort. Take into account that the king was not an absolute dictator; all the free people, including the women, were represented; disputes were adjudicated in regular trials; and there was individual liberty and security. The feudal days in Europe are not considered either uncivilized or primitive, yet the status of the common people then was inferior to that of the African in Ekuikui's kingdom in the 1880's. The common folk of the feudal age in Europe were saddled with an unsympathetic and voracious privileged class. Although they were the inheritors of the cultures of Persia, Greece, and Rome, with the advantages of Christian teaching, yet they were the victims of superstition, as were the Ovimbundu with their profound belief in magic. Jules Michelet says of feudalism that its two great disadvantages for the common people were insecurity and immobility. The people were attached to the soil, and there was no certainty of treatment. The individual Ochimbundu could and did migrate, and Ovimbundu social status was stable. The individual could count upon the continuance of the social order. The stories [in Umbundu] illustrate these facts.

"It is important to keep in mind that the time when the sekulu was a youth in the ombala of Mbailundu was the end of an era. By 1900, a dozen years later, the boom in rubber, the advance of trade, the coming of traders and missionaries and the establishment of a civil administration had rendered this old culture obsolete, and the Ovimbundu were readied for something else.

"In 1957 when a secretary of the mission society visited the mission about a mile distant from this old ombala, the secretary of the association of churches derived from this mission reported for 15 parishes. Each parish had boarding schools for both boys and girls, each had a trained medical helper in charge of a dispensary, and an accredited teacher at the head of the schools, all in charge of an ordained pastor who had been educated for the position. The expenses incurred in operating these parishes were furnished by the African membership of the churches and directed by them -- a very considerable change in less than 75 years.

"What has a 'superior race' and its 'civilization' brought to the Ovimbundu? They have lost their freedom, their culture, and their fatherland. They have gained the disadvantages of the serf: immobility and insecurity, and domination by an alien, privileged racial elite. The Angolan pays taxes to support a regime established without his consent and in no way respecting his needs, rights, and future. He may not leave [his assigned place], even temporarily, without official permission; he may not devote himself to his own business or trade, or cultivate his own piece of ground. He has no certainty that he may stay with his wife and children. At the age of 16 he begins to pay a man's poll tax, a tax equal to 100 days work each year at the legal rate of pay. At the age of 16 every able-bodied male becomes subject to the labor draft. According to the law, unless a man is working for a European, he is counted as vagrant and unemployed, so for his own good he must be supplied work by a paternal government." Since the revolt in Angola, the Portuguese are not only doing away with much of the mission-sponsored educational and health work, but in one way or another killing off many of the native people as well (10).

"The Ovimbundu are a sample of the people of Africa. They are not paragons or super-men; neither are they decadent nor savage. It is hoped that the Umbundu tales, showing a way of life and a culture of the past, may indicate that they have human traits, needs, and emotions common to humanity of all climes and all times" (11).

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About the Authors

SUSAN WELTY (Mrs. Joel Carl Welty) (A 61) and the Reverend and Mrs. Merlin W. Ennis became friends when the Ennises spent a furlough from Angola in Beloit, Wisconsin, in the late 1930's. Mrs. Welty and Mr. Ennis later collaborated on two magazine articles. Mrs. Ennis died three years ago; Mr. Ennis in August, 1964, while this paper was in press and he was eagerly awaiting it. Mrs. Welty is the author of three books: Knight's Ransom, 1951; Look Up and Hope, The Life of Maud Ballington Booth, 1961; and Birds With Bracelets, The Story of Bird-banding a juvenile book soon to be published.

WALTER A. ROWLANDS (A 60) is a professor in the Department of Agricultural Economics and Coordinator of Land Use Planning and Development at the UW. He is a native of Montreal, Canada, and a graduate of the Ontario Agricultural College at Guelph. He came to the UW in 1923 as an assistant in the Agricultural Engineering Department after two years as secretary of the Land Clearing Association in Marinette County.

He has become a national authority in land use planning procedures and is the author of a number of publications in land use planning and rural zoning. In 1958 he received the Superior Service Award from the U.S. Department of Agriculture for "outstanding and sustained leadership in land use planning and rural zoning applied to areas where the price of unguided settlement is economic waste and human suffering."

As well as a member of the Academy, Rowlands is a member of the American Society of Planning Officials, the Soil Conservation Society of America, and the Wisconsin Roadside Council.

KURT W. BAUER (A 63) is executive director of the Southeastern Wisconsin Regional Planning Commission. This Commission is the official planning and research agency for a seven county area which comprises 2689 square miles and has a population of 1.6 million people. This area accounted for 64% of the population increase of the entire state in the last decade.

Dr. Bauer completed his undergraduate training at Marquette University (B.C.E.) and his graduate work at the UW (M.S., Ph.D.) where he majored in civil engineering and minored in city and regional planning. He is also registered as a professional engineer and a land surveyor. He has experience in planning, designing and constructing municipal public works; large-scale high-precision mapping operations; and most phases of community development and improvement.

He is affiliated with the American Society of Civil Engineers, American Institute of Planners, American Society of Planning Officials, Congress on Surveying and Mapping, Highway Research Board of the National Academy of Sciences, American Public Works Association, and American Water Works Association.

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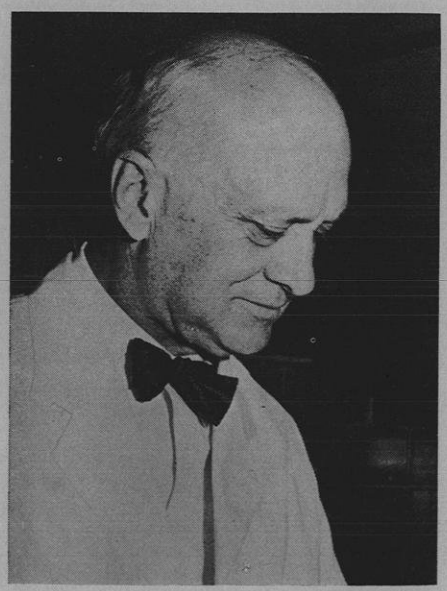
In Appreciation

We are deeply grateful to Professor Emeritus Harry Steenbock, Madison, for his generous financial assistance which has made possible the publication of this 1963-64 Annual Review of the Wisconsin Junior Academy of Science.

Professor Steenbock retired from active teaching and research at the University in 1957 after having been associated with the UW since he enrolled as a freshman 52 years earlier.

In 1925, on the initiative of Professor Steenbock, the Wisconsin Alumni Research Foundation (WARF) was created to handle in the public interest his patent on the discovery that irradiation of milk increases its vitamin D content. The Steenbock discovery has virtually freed the civilized world of rickets, a disease resulting from vitamin D definiency. Through the efforts of Professor Steenbock and other UW scientists, WARF has granted a total of more than $35 million to the UW and the UWM for the support of research and the construction of new buildings.



Professor Harry Steenbock

Professor Steenbock's contributions to the scientific world lie not only in his scientific discoveries and farsightedness in initiating WARF, but also in his encouragement of young men and women to seek scientific careers. President Emeritus E. B. Fred summed up these ideas in a statement to the Board of Regents at the time of Professor Steenbock's retirement as follows:

"Harry Steenbock 'trapped the sun' by discovering and substantiating an inexpensive method for the artifical radiation of foodstuffs to create vitamin D--the 'sunshine' vitamin. With this discovery he enabled mankind to end the great scourge of rickets and make the arms and legs of children throughout the world straight and strong, keep their backs erect and their bones and teeth healthy and normal.

"But that was not all. He helped create the Wisconsin Alumni Research Foundation which made the fruits of his research, and the discoveries of others, produce seeds and grow into further studies and developments benefiting mankind.

"But let us not allow these great contributions to overshadow Harry Steenbock the scholar and professor who, through brilliant teaching, introduced young men and women to the wonderful world of science and sharpened their intellects and curiosity in preparation for scientific careers.

"The chief product of the Wisconsin Alumni Research Foundation hasn't been vitamin D or its other discoveries, but its production of researching young men and women. And the success of the Foundation has been due far more to Harry Steenbock's interest and guidance than to the patent on his greatest discovery."

Wisconsin Junior Academy of Science - a state-wide organization

ORGANIZATION

The Wisconsin Junior Academy of Science was founded jointly in 1944 by the Wisconsin Academy of Sciences, Arts and Letters and the University of Wisconsin. Two advisory committees were established to plan and guide activities "for the discovery and development of scientific ability among the youth of Wisconsin." These committees are the University of Wisconsin Junior Academy of Science Advisory Committee and the State Junior Academy Committee.

The University of Wisconsin Junior Academy of Science Advisory Committee is appointed jointly by the Senior Academy and the University of Wisconsin. It is the over-all supervisory and advisory group which helps give direction to the programs of the Junior Academy.

The State Junior Academy Committee, frequently referred to as the State Committee, is appointed by the President of the Senior Academy. Committee members are usually high school science or mathematics teachers or school system supervisors interested in promoting the objectives of the Junior Academy. The membership is representative of the various geographic areas within the State. The Chairman of the State Junior Academy Committee is appointed jointly by the Senior Academy and the University of Wisconsin Junior Academy of Science Advisory Committee.

OBJECTIVES

To discover and develop scientific abilities and interests among the youth of Wisconsin.

To enrich and stimulate science work in the secondary schools of the State of Wisconsin.

To facilitate cooperation and fellowship among its members.

To develop a background and interest among its membership which will eventually result in leadership in science.

To render public service to the State of Wisconsin.

FINANCIAL SUPPORT

The Junior Academy is a department of the University of Wisconsin Extension Division. As such it has a budget for supporting a staff and maintaining an office on the Madison campus. The present staff of the Junior Academy consists of one full-time instructor and one full-time secretary.

The Senior Academy gives financial assistance to the Junior Academy in several ways: it supports the Junior Academy Scholarship Program, and it financially supports the annual Statewide Meeting of the Junior Academy.

Membership dues from individuals and clubs are used

only to support the awards programs of the Junior Academy.

Several individuals, foundations, and industrial organizations interested in promoting the objectives of the Junior Academy contribute to the awards programs.

ORGANIZATIONAL UNITS

The essential units of organization of the Junior Academy are local science clubs throughout the State. Through individualized work in science clubs, students can investigate some problem of interest to them with the guidance of their teachers. This type of individualized learning situation is not generally available in the classroom and therefore complements regular classroom instruction.

The success of science clubs depends on the willingness of the club sponsors to spend some portion of their out-of-class time with students pursuing a research investigation. Extra-class science activities may influence students to seek scientific careers, and the Junior Academy is willing to provide stimulation and guidance toward such a career.

DIVISIONS

Because of the great differences in the academic background between junior and senior high school students, the Junior Academy has developed separate activities for these two groups of individuals. Activities centering around the various district meetings characterize the Senior High School Division. Activities of the regional meetings of the Junior High School Division are similar in format to district meetings.

SENIOR HIGH SCHOOL DISTRICT MEETINGS

The district meetings have traditionally been the core of the Junior Academy activity since 1944. These meetings are formal sessions of scientific papers presented by high school students (grades 9-12). They differ from "science fairs" in that the students explain their work before a group of people. They make use of various devices--slides, placards, demonstrations, displays, etc.--in their presentation, but judging is based upon the presentation and not upon art work and handicraft. The State Junior Academy Committee has always felt that this type of activity does much to help broaden the individual.

Each research presentation is judged according to the criteria set up by the State Junior Academy Committee. The judges select three winners to represent the district at the Statewide Meeting. Alternate and honorable mention awards are also made. Delegates, alternates and honorable mentions are awarded one-year subscriptions to scientific periodicals of their choice.

JUNIOR HIGH SCHOOL REGIONAL MEETINGS

Regional meetings have been held throughout the State since 1948. They have essentially the same format as district meetings but participation is limited to students in junior high school (grades 7-9).

All presentations are judged according to the criteria set up by the State Junior Academy Committee. Two groups of winners are selected on the basis of judges' scores. These groups are designated as "A" winners and "B" winners respectively. All winners are awarded one-year subscriptions to scientific periodicals.

Regional winners do not compete on a statewide basis, but are encouraged to attend the Statewide Meeting.

THE STATEWIDE MEETING

The Statewide Meeting of the Junior Academy is held each year as a separate section of the Annual Meeting of the Senior Academy. Three delegates from each district of the Senior High School Division make oral presentation of their research. They are judged, and scholarship credit is awarded for the best presentation.

A business meeting is also held. Co-presidents are elected by the club representatives from both the Junior and Senior High School Divisions. Each chartered club has one vote.

JOINING THE W.J.A.S.

Club Membership

Any group of junior or senior high school students working in some phase of science (biology, chemistry, conservation, nature study, photography, physics, etc.) recognized as a club and sponsored by a Wisconsin private or public school or adult organization, is eligible for membership in the Wisconsin Junior Academy of Science.

The membership fee for a science club is $2.00 per academic year. The club will receive a charter and will be placed on the Junior Academy mailing list. Each club member will be entitled to a membership card and participation in the appropriate Junior Academy meetings. An application blank is included in this publication.

Associate Membership

A junior or senior high school student may become an associate member of the Wisconsin Junior Academy of Science. Associate membership is provided for those students who have no opportunity to participate in a science club. The membership fee for an associate member is $0.25 per academic year, and entitles the member to a membership card, participation in the appropriate meetings, newsletters and other services of the Junior Academy.

For further information write: Chairman, State Junior Academy Committee, Wisconsin Junior Academy of Science, Extension Building, University of Wisconsin, Madison, Wisconsin 53706.

SCIENCE CLUBS OF AMERICA

The Wisconsin Junior Academy of Science is a co-operator with Science Clubs of America. Membership in Science Clubs of America provides such services as a guide for science club sponsors, program materials, scholarship opportunities, book lists, etc. At the option of the club, and for a small cost ($3.00), such additional services as a charter and membership cards are supplied.

For further information, write directly to Science Clubs of America, 1719 N. Street, NW, Washington, D. C. 20036.

19th Annual Statewide Meeting at Wausau

The ninteenth annual Statewide Meeting of the Wisconsin Junior Academy of Science was held at the UW-Marathon County Center, Wausau on May 2, 1964 in conjunction with the 94th annual meeting of the Wisconsin Academy of Sciences, Arts and Letters.

Three delegates from each of the seven senior high school division districts of the Junior Academy gave their research presentations. Each delegate prepared a short summary of his presentation and these have been reproduced on the pages which follow.

The sessions of research papers were presided over by Barbara J. Hauck, Messmer High School, Milwaukee and Wayne R. Kirkham, Rice Lake High School.

JUDGING

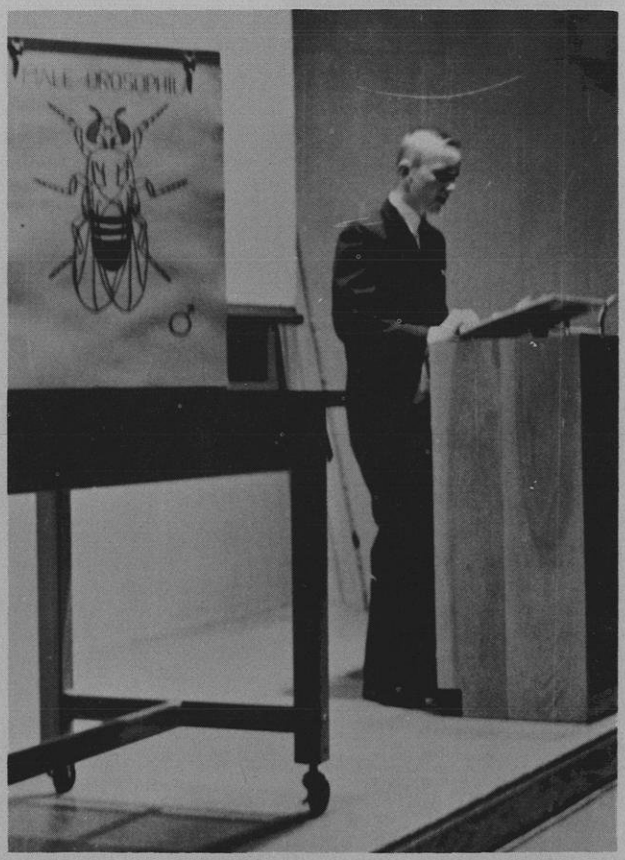
Each presentation was judged according to the criteria adopted by the State Junior Academy Committee. These criteria are used to judge all presentations made at Junior Academy meetings and are explained more fully elsewhere in this publication.

Judges at the sessions were: Mr. Herman Olson, D. C. Everest High School, Schofield; Dr. William R. Schmitz, Mr. Sterling P. Randall, and Mr. Russell D. Welton, all from the Marathon County Center, Wausau.

STEENBOCK-ACADEMY SCHOLARSHIP WINNERS

Funds were made available to the Academy by Professor Harry Steenbock, Madison, for the perpetuation of the Junior Academy Scholarship Program. It is for this reason that his name is being used in connection with these awards.

The two students selected by the judges to receive the $100 Steenbock-Academy Scholarships were: W. James Dwyer, South High School, Sheboygan, for his presentation entitled "The Therapeutic Uses of Bacteriophage in Epidermal Infections in Rats"; and Erich G. Marquardt, Waukesha High School, for his presentation entitled "Radiocarbon Dating."



AAAS AWARDS

Awards of one-year honorary memberships in the American Association for the Advancement of Science went to Barbara A. Behnke, Mary D. Bradford High School, Kenosha, and Perry Nealis, Columbus High School, Marshfield. Their presentations were entitled "Thin-Layer Chromatography Determination of Sugar in the Urine" and "Photo Effects on the Behavior of Human Spermatozoa," respectively. Nealis will be representing the Wisconsin Junior Academy of Science at the meeting of the American Junior Academy of Science to be held at Montreal on December 28, 1964.

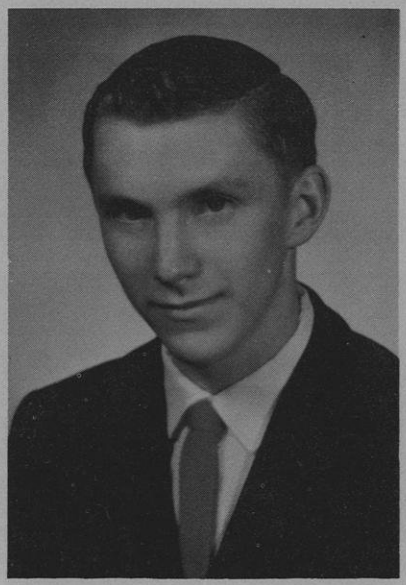
1964-65 CO-PRESIDENTS

Co-presidents selected to preside over the Statewide Meeting to be held May 8, 1965 at the University of Wisconsin, Madison, were Karen J. Kuester, South High School, Sheboygan, and Perry M. Nealis, Columbus High School, Marshfield.

The research papers which appear on the following pages are those which were presented at the Statewide Meeting.

Specific questions or comments concerning these reports should be addressed to the authors.

Therapeutic Uses of Bacteriophage in Epidermal Infections in Rats



W. JAMES DWYER

South High School
3128 S. 12th St.
Sheboygan, Wis. 53081

Raymond D. Larson, sponsor

As the general use of antibiotics became accepted, an ever-increasing number of pathogens succeeded in mutating in such a way as to render these "wonder drugs" ineffective regarding their growth potential. This ineffectiveness represents a "weak link" in the chain designed to eliminate disease. For this reason, a control which is either not affected by mutation or is capable of duplicating its changes must be developed in order to eliminate this growing inadequacy.

It was thought that a biological control, such as a specific bacteriophage, might exhibit the desired characteristic of ready mutation. If such a readily mutable phage, or perhaps a mixture of closely related phages, could be shown to cause positive lysis of bacterial cells cultured in an in vitro environment, it would be reasonable to expect that a similar result could be obtained in an in vivo situation. Problems immediately became evident. Being a foreign protein, would not the normal, protective mechanism, that is, blood, pus, and antibodies, endeavor to destroy the phage as well as the bacteria? Given the normal phage-bacterium relationship, would the desired lysis, as opposed to prophage activity, take place? In short, would there be any therapeutic value in a "phage approach" to the problem of bacterial diseases? The answers to these questions were determined in the following manner.

EXPERIMENTAL

Thirty-six, inbred white rats were divided into six groups of six per group. The first group was used as a control and no variable was introduced. In the second group, however, sterile broth was injected just beneath the skin in the general abdominal area. The rats in the third group were injected as before with 0.5 ml. of a suspension of 10^6 Escherichia coli, B_1, and bacteria. In the fourth group, 0.5 ml. of a mixture of 2×10^8 phage particles (mutably specific for E. coli), B_1, and 10^6 viable bacterial cells was injected in the same man-

Group I	- Control
Group II	- Broth Injection
	N (0.0% infection)
Group III	- Bacteria Injection
	N (90.0% infection)
Group IV	- Bacteria-Phage (mixed) Injection
	N (0.0% infection)
	P (30.0% infection)
Group V	- Bacteria Injection:Phage Injection
	N (20.0% infection)
Group VI	- Bacteria Injection:Phage Diffusion
	N (20.0% infection)
	P (50.0% infection)

Figure 1. Infection Percentages

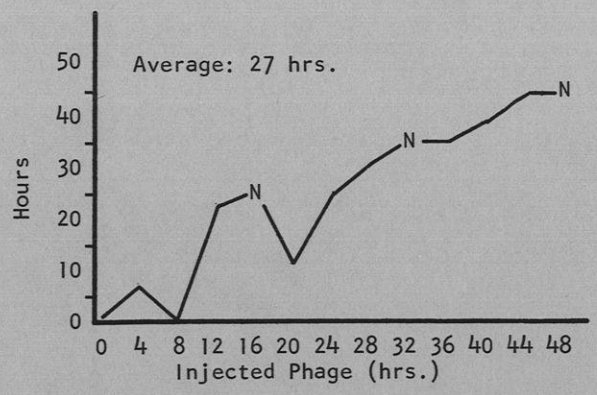


Figure 2. Effectiveness as a function of time. (Injected Phage)

ner. In the fifth group, the same suspension of viable bacterial cells was injected as before in all rats, followed by injections of the usual concentrations of phage particles at various time intervals. Finally, in the sixth group, the same suspension of bacteria was injected in all rats, followed at time intervals by rubbing of phage upon the skin of the infected area. Times of beginning and termination of infection were noted in all cases, with the following data obtained:

RESULTS

As shown in Figure 1, the relative mutation percentages of the bacteria that could not be duplicated by the phage are very low. This points to the high rate of mutability of the phage approach. The character "N" in Figures 2 and 3 shows when a normal of about 110 hours was achieved. These represent assumed mutations. Finally, in Figure 4, the comprehensive effectiveness of the phage approach is summarized. Clearly, the presence of bacteriophage is a determining factor in minor infections.

CONCLUSION

Based upon the experimental data showing the phage approach to be 400% as effective as normal body mechanisms, the low percentage of escaped mutations, and other incidental information gathered during the course of this project, it is safe to state that under certain circumstances, such as might be encountered in minor epidermal infections, there is a definite therapeutic value in the phage approach to the problem of resistant bacterial strains.

ACKNOWLEDGEMENTS

My sincere thanks are extended Dr. James D. Michael, of the Sheboygan Clinic, Mr. Raymond D. Larson, Mr. Erland W. Johnson, and the faculty and staff of Sheboygan South High School for their help and encouragement.

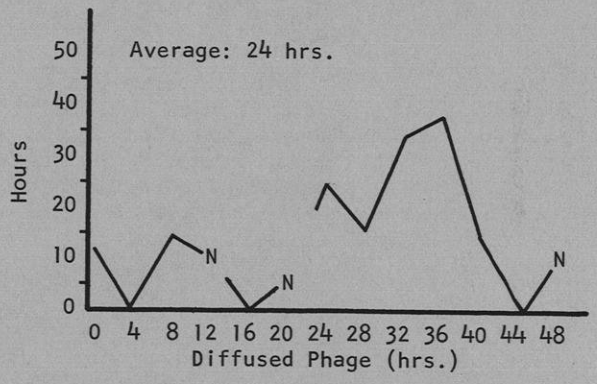


Figure 3. Effectiveness as a function of time. (Diffused Phage)

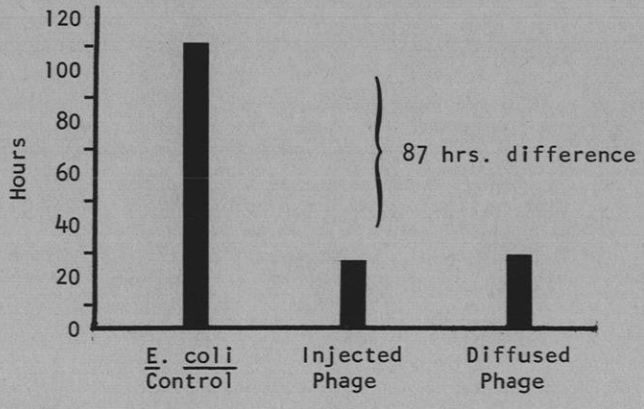
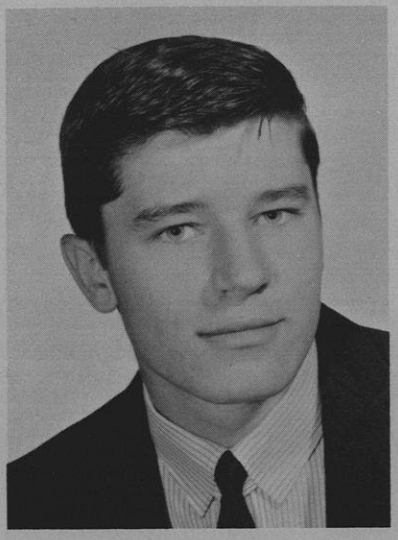


Figure 4. Relative phage approach effectiveness.

Photo Effects on the Behavior of Human Spermatozoa



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This project is a study of the physical reactions of human spermatozoa to photo stimuli produced by white, red and ultraviolet rays. Nothing in the appearance of the human spermatozoon suggests that it should be photosensitive, but its chemical structure determines how it will react to light.

ULTRAVIOLET RADIATION STUDIES

Ultraviolet irradiation of human spermatozoa was the first in the series of tests used. A water-cooled ultraviolet lamp which emits a wave length of 2600 Å, the wave length proven to fracture DNA, was used. Human semen ejaculates obtained from clinical patients and supplied for this project by the Marshfiled Clinic were tested for sperm count, the number of sperm per ml. and for sperm motility, the percentage of motile sperm. One ml. of the sample was exposed to the ultraviolet rays at a distance of one inch from the light source and rotated to permit uniform irradiation. The time of exposure was varied from five to fifty minutes but with the wave length remaining constant. Immediately after irradiation a second sperm motility count was taken to determine to what degree the sperm were affected. It was found that sperm motility was decreased approximately five to ten per cent per five minutes of irradiation. From these findings, it can be concluded that human spermatozoa are definitely affected by ultraviolet light. However, their environment, the seminal fluid, may also be an influencing factor, since it can be assumed that the fluid could be ionized by the ultraviolet rays to varying degrees depending on the exposure.

PHOTOPHOBIC-PHOTOPHILIC STUDIES

The second step in my investigation was to ascertain whether the sperm, if given an alternative would approach light or shun from it. For this a 9 cm. section of surgical tubing was filled with normal saline solution and stopped at each end with a 1 cm. translucent glass rod. The tube was then graduated every 0.5 cm. on each side starting from the center marked 0. One-tenth ml. of the semen was then carefully injected into the tube at the center 0, to get equal diffusion on both sides. It is important to note that semen was diffused into the saline approximately one or two cm. on either side of point 0, and therefore segments one to four on either side were considered irrelevant. The loaded photo tube was placed into a "dark box" prepared for this test. Care was taken not to create diffusion in the solution during the loading. Then natural light was allowed to enter the tube through its protruding glass stoppered end. It is known that human spermatozoa can swim approximately 2 cm./hr. Theoretically, then, the sperm in this case could make the 4 cm. on either side of point 0 in two hours. At the end of the two hours the photo tubes were frozen to stop action and later were cut into 0.5 cm. segments from point 0 for sperm count. With these figures the number of sperm which approached the light was calculated as well as those which shunned from it. From the results shown in Figure 1 the ratio of sperm in the segments on the end farthest from the light compared with those in the end nearest to the light was approximately 2:1 and the ratio considering just the significant figures from segments five, six, seven and eight was 16:1. These facts point out that the human sperm tested were definitely photophobic to white or visible light.

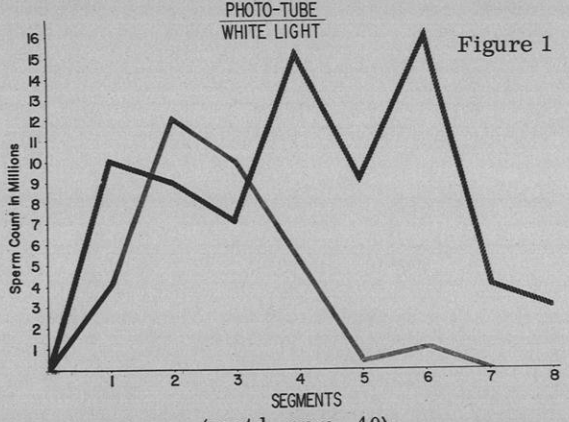

Figure 1

(contd. on p. 40)

Biological Clocks: Photoperiodism in Mice

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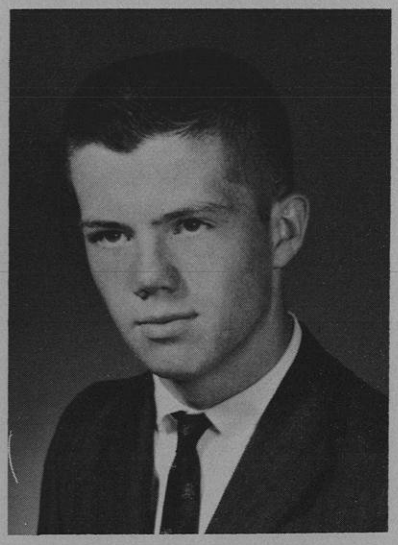

Biological clock is an abstract term, one which is relatively unknown, mainly because of poor publicity. These so-called "clocks" should be thought of more as timers. They control cycles that may last for an hour to a year, most of them corresponding to well-known astronomical periods.

Organizations and individuals such as Purdue and Harvard Universities, the Armed Forces, and especially Professor F. M. Brown of Northwestern University have contributed most of what we know about the subject today.

THE PROBLEM

The main purpose of the project was to determine the effect of the photoperiod on the amount and cycles in the total activity aspect of biological clocks. The first thing to do was find the most probable hypothesis. The one that was picked stated that the photoperiod does not affect the cycles of total activity or the amount. (A conflicting effort to keep with the environment was allowed for, however.) Mice were used because the practicability and the representiveness of most mammals far outweighs other factors.

AMAMAR

To begin with, there were two problems. The first of these was finding the most probable and practical way of measuring the activity, then interpreting this information.

The former problem was overcome by designing and building the Automatic Mouse Activity Measurer and Recorder, or the AMAMAR. The operation of this machine can be seen in Figure 1. This gave unexpectedly excellent results.

Two of these AMAMAR's have been built. One was for the control mice and one for the experimental mice. The controls were always in contact with the environment, while the experimentals were kept in a closet which had equal temperature, ventilation, etc.

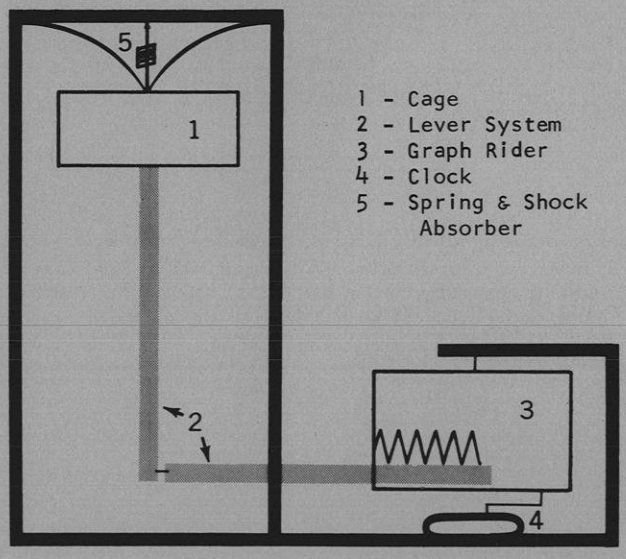

Figure 1. AMAMAR (Automatic Mouse Activity Measurer and Recorder).

The pattern was formed as the following experiments, designed for accuracy and complete coverage, took their place in the notebook: a 6, 8, and 14 hour photoperiod; and a continuous day, night, and unpatterned photoperiod. The experiments each took 36 hours, which was as long as possible. Before each of the above variations, a conditioning period was initiated for the experimental mice.

RESULTS

The graph (Fig. 2) exemplifies the results. Everyone of the interpretation graphs was almost identical. The control graphs were compared and found to be almost identical to the others.

(contd. on p. 40)

That Terrible Torus

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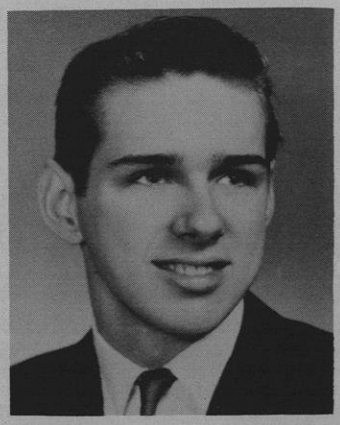

The torus has become one of the more important geometric solids in design and engineering today. Its use can be seen in a host of creations from the torque convertors and fluid couplings in automatic automotive transmissions to the space wheels soon to fill the heavens. To find out what made this solid geometric surface so versatile and desirable, it was necessary to study the mathematical properties of this surface.

GENERAL EQUATIONS

The general equation of the torus was derived with the torus' circular axis in the xz plane, its linear axis coinciding with the y axis. "a" was used to represent the distance, in the xz plane, from any point of the surface to the circular axis. The equation derived was Equation 1. The form after

$$E = \sqrt{(\sqrt{x^2 + z^2} - a)^2 + y^2} \qquad \text{(Eq. 1)}$$

$$E = \sqrt{\left[\sqrt{(x-h)^2 + (z-k)^2} - a\right]^2 + (y-j)^2} \qquad \text{(Eq. 2)}$$

the axis was translated, Equation 2, was not used in any of the intersections, since the surface is the same, the only change being in the location of the x, y, and z axes.

Using Equation 1, the torus was degenerated to a circle (a = y = 0), a sphere (x = z = 0), and a point (E = 0).

At this time, it was necessary to derive the other curved surfaces used in the intersections. The general equation of the cone (Eq. 3) was merely taken from last year's project. The equation of the sphere is represented by Equation 4, and the general form of the ellipsoid (of revolution about the y axis) is represented by Equation 5.

$$x^2 + z^2 = \frac{(y - b)^2}{m} \qquad \text{(Eq. 3)}$$

$$k = \sqrt{x^2 + y^2 + z^2} \qquad \text{(Eq. 4)}$$

$$L = \sqrt{x^2 + z^2 + by^2} \qquad \text{(Eq. 5)}$$

INTERSECTION STUDIES

The first intersections taken were those of the planes with the different cases of the torus. (The torus before degeneration shall be referred to as the standard torus, and has three cases which will be defined later. The torus degenerated to a sphere shall be called the spherical torus, and the torus degenerated to a circle will be called a circular torus. The point was not used, since its intersection is either empty or a point.) The intersection of the torus and plane x = 0 was two congruent non-intersecting circles with centers at (0, 0, z) and (0, 0, - z) for Case 1 of the standard torus. This same intersection in Case 2 was two congruent tangent circles with centers the same as in Case 1. In Case 3, the intersection was two congruent intersecting circles with centers the same as in Case 1. These intersections were the same with the plane z = 0. The intersection of the plane y = 0 and Cases 1 and 3 of the standard torus was two concentric circles. The intersection of this plane with Case 2 was a circle and the point of its center.

More intersections were performed with these tori and planes parallel to the xy, xz, and yz planes. Then this same process was carried out with the degenerate tori.

The next step was to intersect different cones, spheres, and ellipsoids, both with and without their y axes translated, with each of the tori, in both the standard and degenerate forms.

In studying these intersections, it was possible to study the properties of the three standard tori by comparison with those more familiar solids: the sphere, the cone, and the ellipsoid. Then, by studying further the intersections of the degenerate tori, it was possible to observe how the geometric properties of the torus change as it approaches these other geometric solids.

Thin-Layer Chromatography of Urine Sugars

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Mary A. Doherty, sponsor

In recent years paper chromatography was applied in medicine to determine sugar in urine. But in the last few years there appeared in analytical chemistry and biochemistry another tool, thin-layer chromatography, which, because of its separatory efficiency, rapidity, and simplicity has found many applications in analytical laboratories. To find out how this new method would work in the determination of sugar in urine was the aim of this experiment.

GENERAL TECHNIQUE

A thin layer of Silica-Gel G (250-300 microns) was applied to glass plates and dried. By means of micropipettes, the substances to be chromatographed were applied to the adsorbent 1.5 cm. from the bottom of the glass plate. After these spots had dried, the plates were inserted into the tank holding the solvent system which had a depth of about 0.5 cm. At the completion of the run, the plates were removed from the solvent system and dried. The separated substances could be detected by spraying with suitable reagents and drying at elevated temperatures.

The equipment used in this experiment was made in the laboratory.

EXPERIMENTAL

Only a few sugars have been found in abnormal urine; those most frequently found are: glucose, galactose, fructose, lactose and xylose. Although, in most cases, a patient's urine contains only one kind of sugar, there are cases when urine contains two and three sugars (very seldom more). Therefore, it is important to use a solvent which would separate these sugars distinctively. After many trials the following solvent systems were used:

Solvent System 1: Methyl-ethyl ketone, acetic acid, methanol (3:1:1)

Solvent System 2: Ethyl acetate, isopropanol, water (65:25:10)

The rate of flow given in Table I is expressed as Rg, where g = glucose as reference compound.

Development of spots were made by the spray reagent, aniline-diphenylamine.

Table I

Pure Sugar ↓	Rate of Flow (Rg) Solvent System 1	Rate of Flow (Rg) Solvent System 2	Development: Aniline - Diphenylamine
Fructose	0.84	1.32	red - brown
Galactose	0.82	1.05	blue - gray
Glucose	1.00	1.00	blue - gray
Lactose	0.39	0.23	blue - gray
Xylose	1.16	2.20	blue

Solvent System 1 (Table I) shows that fructose and galactose have the same Rg value, but the presence of both of these sugars in one specimen of urine is very rare and therefore Solvent System 1 and aniline-diphenylamine spray reagent practically solve the problem. In case of doubt, chromatography must be performed with both solvent systems.

Using Solvent System 1 and aniline-diphenylamine spray reagent, 39 urines received from Kenosha Memorial Hospital were analyzed; the findings were:

2 contained lactose
1 contained xylose
4 contained glucose plus some fructose
1 contained glucose plus some lactose
1 contained glucose plus some galactose
29 contained glucose
1 contained fructose

The chromatograms were sharp and conclusive.

CONCLUSION

Thin-layer chromatography is an excellent method giving a clear and decisive answer as to what kind of sugar is present in a urine sample.

(contd. on p. 41)

Experimental Analysis of High-Energy Sparks

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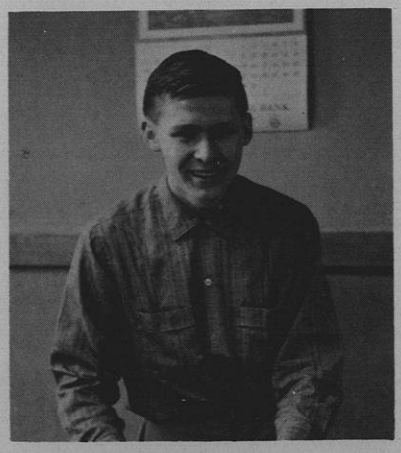


Analysis of the phenomena associated with high-energy sparks and the explosion of wires has gained much impetus with the perfection of instruments such as the ultra-high-speed camera, which can be used to directly observe events taking place during infinitesimal periods of time. The motive for these studies has been to analyze the shock waves generated by these related phenomena and to apply this information to the designing of rockets and related materials.

This paper summarizes the author's experiments on phenomena other than shock waves occurring in high-energy sparks and wire explosions and analyzes the findings of these experiments in terms of known physical laws and principles.

APPARATUS

The apparatus consisted of a 0.44 mfd. capacitor and a 4500 volt, 20 ma., d.c. power supply, used to charge up the capacitor. The energy stored in the charged capacitor, 4.4 Joules, could be discharged at will.

WIRE EXPLOSION STUDIES

The first phenomena to be studied was the explosion of a wire. Since it was not feasible to construct or to purchase the elaborate equipment needed to analyze wire explosions, it was necessary to devise a cheaper, but equally effective method. In the method finally selected, a 0.002 cm. diameter copper wire was drawn taut over the surface of a common slide, until it was 1 mm. above the surface, while the two ends of the wire were fastened to metal blocks on either side of the slide to facilitate detonation of the wire. The discharge of the capacitor through the wire would produce an explosion depositing characteristic compounds on the slide, indicating the type of reaction that had occurred in that specific region. It was first believed that the slide's proximity to the reaction would produce a distorted picture of the explosion; however, microscopic examination of the slides and examination of 35 mm. slides made of the reaction indicated an orderly sequence of events was taking place.

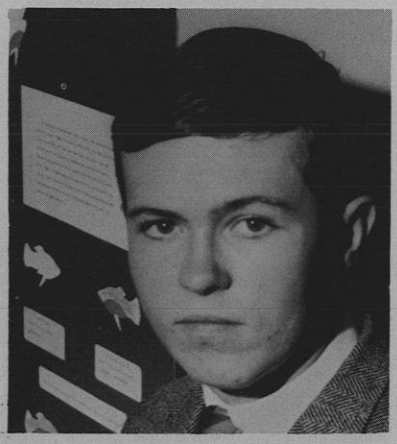
As current begins flowing through the wire, it becomes white-hot, expanding to over four times its normal 0.002 cm. diameter. As the reaction progresses, the wire's surface vaporizes, formin an expanding cylindrical envelope of ionized particles around the central wire. Exactly how much of the wire is vaporized during this phase cannot be determined from these experiments. However, as the cylindrical mass approaches a definite critical size, usually over ten diameters, major eruptions, reminiscent of solar flares, emanate from the cylinder's surface. These eruptions must upset the equilibrium of the reaction and send the once orderly phenomena into chaos. The explosion in all probability ends soon after this phase.

SPARK DISCHARGE STUDIES

Experimentation was also done on the discharge of a spark across the surface of water. A 12 x 20 cm. flat metal electrode, connected to the negative terminal of the capacitor, was immersed 1 cm. below the surface of a glass container containing 500 ml. of distilled water. The wire connecting this plate to the negative terminal was bared at the water level, while a wire connected to the positive terminal was formed into a pointed discharge-electrode which could be discharged anywhere into the water surface. Effects of ion concentration on maximum possible spark distance was determined by adding 15 mg. quantities of NaCl to the test dish and measuring the distance a spark would travel across the water surface to different concentrations. It was found that the maximum spark distance varied directly as the concentration of ions in the water up to approximately 150 ions of solute per million parts of solvent. The longest distance a spark would travel across the water surface was 11 times the discharge distance in air (0.5-5.5 cm), while the minimum distance, in distilled water, was only four times the air distance (0.5-2 cm.). The addition of more ions after the maximum discharge length was reached caused a decrease in the discharge distance. Changing the polarity of the electrodes caused arc distance to decrease by 40% in all concentrations. This points to the probable existence of a surface layer of the same charge as that on the plate electrode. The spark can travel further with a negative plate electrode since a force field must exist that produces a net negative charge on the water surface, forming a surface layer with de-

(contd. on p. 41)

'Creating' the Bleeding-Heart Platy



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Catherine G. Collins, sponsor

In the flying cage of the New York Zoological Society's bird house, Dr. Myron Gordon, curator of fishes and expert in the field of genetics and heredity, sat admiring a variety of birds from many parts of the world. Near one corner where he sat lay an inconspicuous gray pigeon; when it rose and walked toward him, he saw its white breast feathers clearly and the frightening fact that they were stiff and streaked with blood-like crimson. His impulse was to call a keeper, but first he searched the picture labels for the bird's name; it was the Luzon Bleeding-heart Pigeon. The blood then, was part of the color pattern. Dr. Gordon was so impressed by this pattern that he decided to "create" a bleeding-heart tropical fish. This is the story of the fish's creation, by Dr. Gordon and myself, through two years of experimentation.

BACKGROUND WORK

To heighten the crimson effect, Dr. Gordon first had to perform a series of genetic experiments to obtain a clear white fish. The fish used by Dr. Gordon and myself for all of the following experiments was the Platy-poecillus maculatus, selected because it is a livebearing fish, and because for variety of color patterns it is unmatched by any other creature in this hemisphere.

In Dr. Gordon's initial experimentation, a Leopard Platy with black spots on a white background was crossed to a clear Gold Platy. In terms of the Mendelian factors of inheritance, it may be said that the black spots of the Leopard Platy and the gold body coloring of the Gold Platy are dominant, so the first generation offspring were black-spotted and golden.

These black-spotted-golden hybrids were not, in themselves, what Dr. Gordon wanted, but they had the characteristics within them--whiteness and unspottedness--which he could now extract. By mating two of the hybrids Dr. Gordon obtained the fish he wanted, a white, unspotted Platy, in the proportion of one out of every sixteen offspring. In five years the Ghost Platy was common in many parts of the United States.

EXPERIMENTAL

I began raising tropical fish when I was ten, and three years ago became interested in the experiments of Dr. Gordon. I attempted to purchase some bleeding-hearts, (white fish with crimson breasts) but was disappointed to find that none of the tropical fish dealers I approached had any. So I decided to "create" some bleeding-hearts of my own, and it wasn't until two years later that I had what I wanted, through three generations of selective breeding.

I purchased ten Ruby-throat Platys (gray fish with red breast markings), and kept them in a small aquarium for observation purposes. I did the same with the group of white Ghost Platys, (the type developed by Dr. Gordon). After several months of concentrated feeding with live food, I mated the two best looking and healthiest fish. An abundant brood (38) was obtained, and since the gray-red combination is dominant over white, all the young resembled their ruby-throat parent.

At this time, after almost a year of experimentation, a parasitic disease killed all but seven of my hybrids. Perhaps this was a "blessing in disguise" however, for the healthy fish that remained added new vigor to my strain. There was only one more step in the creation of the fish.

RESULTS

The hybrids of the Ghost and Ruby-throat Platys had genetic characteristics already to fall in place, and when I selected the two best and bred them:

Three of every sixteen were a wild type--a throwback to the wild ancestry of the wild ruby-throats.

One of every sixteen was white, a Ghost Platy resembling the grandparent.

Nine of sixteen were gray and ruby-throated, like the original wild-type grandparent.

Three of sixteen were ruby-throated and white-bodied - the Bleeding-heart Platyfish I had been seeking.

Since the experiment's conclusion last August, I have been inbreeding the Bleeding-heart Platyfish to improve on the color pattern and the intensity of the strain's color.

The Effects of UV Light on E. coli

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It is a commonly known fact that ultraviolet light has a germicidal effect on bacteria. However, what is not such common knowledge is the exposure time necessary to have lethal effects on the bacteria. This was the purpose of this experiment, which was carried out twice.

PROCEDURE

A pure culture of Escherichia coli strain B_1 was subcultured in 50 ml. of nutrient broth which was taken from a 1000 ml. of solution containing peptone, NaCl, beef extract, and water. From the 50 ml. suspension, 1 ml. was transferred to a tube containing 9 ml. of sterile water. From this tube was taken another 1 ml. which was in turn transferred to 9 ml. of water. This was repeated six times and on the sixth dilution 1 ml. was added to a quantity of nutrient agar warmed to 42° C. This agar plate was then incubated for 24 hours and then subjected to a standard colony count. This count showed that in Trial I there was 2.4×10^7 bacteria per ml. in the stock solution. Trial II produced approximately 3.5×10^7 bacteria per ml.

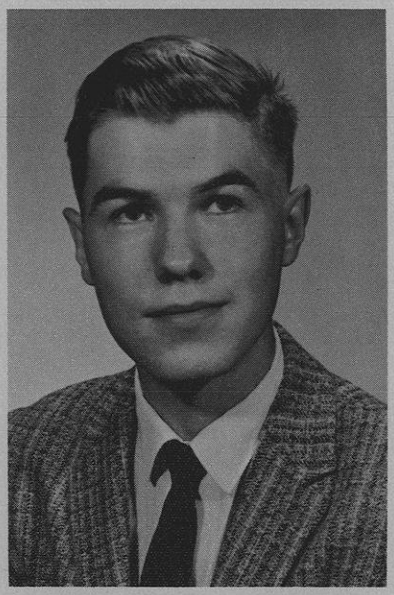
The next step in both trials was the irradiation itself. In Trial I, a nonspecified quantity of nutrient broth was placed in each of six petri dishes which were then given 1 ml. of stock solution and exposed to ultraviolet light for periods varing from one minute to six minutes. After exposure, 1 ml. of each dish was put through a standard dilution and then plated as before. After 24 hours of incubation, it was found that there was very little difference in the number of bacteria on these plates and those on my standard. This clearly suggested that for some reason the light was not penetrating as it should have. A probable reason for this behavior is that the 2557 angstrom light used was not powerful enough to penetrate the plastic covers of the petri dishes used. Thus, on the second trial the covers of the plastic petri dishes were removed while the plates were under the ultraviolet light. At this time a contamination factor was introduced. This was the bacteria which are in the air and enter the dish in the brief moment that the cover is removed. However, this is not too significant because the factor remains the same throughout the experiment, and also once the light strikes the aerial bacteria, they are assumed to be dead.

Another change that was made in Trial II was a step to avoid unnecessary dilutions. Since dilution tube number six had given the best reading, this was the tube from which the 1 ml. for ultraviolet radiation was taken. However, it was desired to change the amount in tube 6 to a larger quantity. To achieve this, 1 ml. from tube 5 containing 3.5×10^8 bacteria per ml. was added to 10 ml. of sterile water thus creating the same ratio as the one desired only in a larger quantity. From this suspension, 1 ml. was taken and added to agar of the type and temperature used previously. These were irradiated in the manner previously described and incubated for 24 hours. This time, the number of living colonies showed a similarity only in the one, two, and three minute radiations. At four minutes, a decrease of 3.3×10^7 was noticed. After six minutes, this had decreased to 0.9×10^7 bacteria per ml.

CONCLUSION

On the basis of the evidence which has been presented, the conclusion can be drawn that the amount of exposure time to the ultraviolet light is increased, the number of living bacteria decreases proportionately.

The Effects of a Magnetic Field on a Living Organism



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Lawrence A. Nutter, sponsor

Many intangible forces effect our daily lives. Two of the forces are gravity and nuclear radiation. Since our earth is to a large degree a giant magnet, it seems feasible that the force of a magnetic field could also have an effect.

It has been reported by Dr. Spangler that particles within the cytoplasm of the one-celled animal, Paramecium, have been found to align themselves along magnetic lines of force.

A high school student in Phoenix, Arizona, found that the rate, size, and direction of growth of the slime mold (Physarum polycephalum) were altered in the presence of a magnetic field although his results were somewhat inconclusive as to the specific alterations.

PURPOSE

The purpose of my investigation was: 1.) To determine if a magnetic field produced any effect on a living organism; 2.) If so, what was the physical effect; and 3.) Why the organism was affected.

To answer these questions I decided to experiment with the common bread or penicillium mold.

EXPERIMENTAL

The first mold culture was subjected to the south pole of a bar magnet and showed a marked attraction. The second culture was subjected to the north pole of a bar magnet and showed a very slight repulsion. The third culture was subjected to the north pole of a cylindrical magnet and showed an attraction. The fourth culture was subjected to a horseshoe magnet and showed an attraction for the south pole. The fifth culture was subjected to a bipolar AC electromagnet and showed a repulsion. Three controls were grown to compare growth patterns. The sixth culture was subjected to two complimentary bar magnets and the mold was attracted to the south pole of one magnet and was repelled by and attempted to follow the lines of force around the other magnet's north pole.

CONCLUSIONS

The results of my experiments prove very definitely that there is an effect on the mold by a magnetic field.

The mold is definitely attracted to the south pole of a magnetic field. It is repelled somewhat by the north pole and attempts to follow the lines of force towards the south pole.

An extract was made of the mold and analyzed chemically. Cobaltic chloride was found to be the compound to be responsible for the effect.

Wax beans were grown and found to be attracted to the south pole of two complimentary bar magnets. Chemical analysis was done on extracts of the leaves, stem, and roots and cobalt was found again.

Experiments have been started on goldfish and a behavior pattern has been established showing an attraction to the south pole.

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Heredity of Planaria

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In order to more fully understand the heredity of planaria, a basic background in regeneration must be gained. Planaria were subjected to the five basic cuts for regeneration. These cuts were:

1. Planaria were cut from pharynx to posterior end. A knife was used to keep the pieces separated. Two tails developed.

2. Planaria were cut toward the anterior end after the head was removed. Two heads developed.

3. Planaria were cut into eight pieces on ice to prevent them from moving. Instead of the head and tail developing from the normal ends, the head developed from the posterior end and the tail from the anterior All other pieces regenerated normally.

4. Planaria were cut into three pieces laterally. A head developed anterio-laterally and a tail posterio-laterally.

5. The head was removed and a small section taken out just below it and on one side. A normal head developed at the first cut and a smaller head at the second.

HEREDITY EXPERIMENTS

The experiments concerning heredity were then started. An exposure chamber was built. Two 100-watt blulbs were placed at the top of a glass trough containing two electrodes, through which a complete electric circuit could be passed.

Untrained animals were subjected to the electric shock and simultaneous light flash. The shock caused the worm to react by contracting. After about two hundred exposures, the worm contracted just as the light was flashed on; even if the electric shock was received or not.

PHASE ONE

In the first experiment, trained planaria were cut in half. The pieces were allowed to regenerate. These new worms were then tested to see if the "knowledge" that their parents possessed was passed on to them. One might have expected the worm with the original brain to show some recall, but not the new worm without the original ganglia. Yet both showed an amazing knowledge of these inherited powers. The results seemed to indicate that the brain was not absolutely necessary for remembering.

PHASE TWO

The second experiment was to find out how far this inherited power could be transmitted. Trained planaria were cut in half and the tail thrown away. The head was allowed to regenerate a new tail. A second cut was made and the head discarded. The tail was then allowed to grow a new head. This worm still remembered the lesson that the parent had learned one generation before.

PHASE THREE

Since the brain seemed to play a minor part in the retention of learning, DNA and RNA must play a more important part. DNA was involved because it is the molecule which is responsible for the new tissues and any characteristics inherited. DNA was not working alone though. RNA transmitted the DNA code to the ribosomes where the proteins were made, and therefore seemed to be the logical place for the stored knowledge. Another experiment was performed in which the trained planaria were placed in a solution of an enzyme (RNASE) which broke down the RNA molecules. The results indicated that RNA was involved with the transmitting of knowledge from one generation to the next, because the piece containing the head was not affected, while the tail did nothing when exposed to the light. It appeared that the enzyme erased the knowledge. It seemed that when the brain was not in the parts, a type of molecular photography replaced it and was able to transmit the knowledge from one generation to the next.

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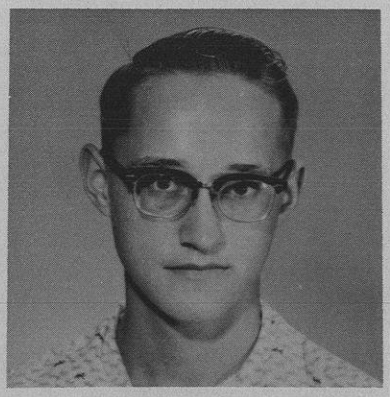
Indimetry



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Indimetry means inter-dimensional measure. It is Euclidean geometry of n dimensions. Previous work (see WJAS Annual Review 1962-63) amounted to laying the general foundation for indimetry. The past year was spent building upon this foundation in two major areas. The first was the relationships among hyperplanes (points, lines, planes, and their higher dimensional counterparts). There are four types of hyperplanes, the first being the confining one, the one in which the relationships are confined. It is referred to as "c" and its dimension is d_c. Second is the reference hyperplane (r) of dimension d_r. It is the one to which others are related. Those related to r are p's, of dimension d_p. The final type of hyperplane is the intersection of r and the p's ($r \cap p$) and is of dimension $d_{r \cap p}$.

The number of perpendiculars in any situation may be found from the following three statements:

If $d_c + d_{r \cap p} < d_r + d_p$, there are 0 perpendiculars.

If $d_c + d_{r \cap p} = d_r + d_p$, there is 1 perpendicular.

If $d_c + d_{r \cap p} > d_r + d_p$, there are an infinite number of perpendiculars.

Likewise, the number of parallels at any given distance is:

0 if $d_r \geq d_c$ or $d_p \geq d_c$, 2 if $d_r = d_p = d_c - 1$, and infinite in all other cases where $d_r < d_c$ and $d_p < d_c$.

The final type of relationship to date is intersection. Nonparallel hyperplanes s and q will intersect according to the following expression:

$$d_{s \cap q} \geq d_s + d_q - d_c.$$

If s and q are assumed to occupy all of the dimensions of c. it becomes an equality. A negative result indicates that s and q are skew.

MEASUREMENT OF POLYTOPES

The second area of indimetry which was developed was measurement of ploytopes (the figures of indimetry). It was found to be impractical to work with anything other than regular or semiregular polytopes. There are three commonly used variables involved: d, the dimension of the polytope; E, the length of the edges of the polytopes; and d_m, the dimension of measurement. The dimension of measurement tells the dimension of the unit of measure. For instance, d_m equals the exponent in cm., in., $cm.^2$, $yd.^2$. $mm.^3$, $in.^4$, etc. In terms of these three variables, it was possible to find a formula for the measurement of each of the 3 regular polytopes. That of the simplex (the simplest figure of each dimension, it has the dimension plus 1 points each equidistant from each of the others), shown below is typical. The symbol $\mathcal{S}$ is an original variation of the integral which means the measurement (of a polytope). The type of polytope follows it. A subscript and a superscript will indicate the dimension of the polytope and of the measurement respectively, if other than d and d_m:

$$\mathcal{S}_{\text{Simplex}} = \binom{d \quad +1}{d_m + 1} \frac{E^{d_m} \sqrt{2^{d_m}\,(d_m+1)}}{(d_m)\;!\quad 2^{d_m}}.$$

One type of semi-regular polytope has been defined, the prism. Originally, it was the same as the geometric prism, except that its bases could be of any dimension. The formula for the measure of a right prism is shown below, where E' is a lateral edge. By having the regular polytopes as bases,

$$\mathcal{S}_{\text{Right Prism}} = 2\mathcal{S}^{\text{base}}_{d-1} + E' \overset{d_m - 1}{\mathcal{S}}_{d-1}\,\text{base}$$

the formulas for their measure can be substituted in for the measurement of the base, thereby expressing the prismatic measurement entirely in terms of E, E', d, and d_m. More recent, and as yet incomplete, work has been done with prisms having more than two bases, a prefix to prism denoting the number of bases.

There is much future to this project. These and all other areas of geometry are open for expansion as well as other mathematical approaches to geometry.

Ultrasonics

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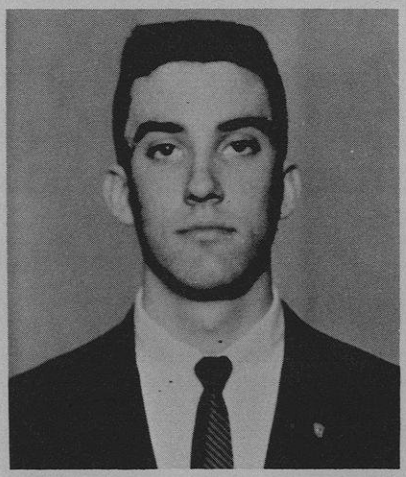

Being in its infancy, the field of ultrasonics holds many possibilities with respect to a great diversity of practical applications. One problem that seems to occur, however, is that although the sound may be easily generated to high frequencies, it is often hard to control or focus. Therefore, it was the purpose of this experiment to devise a transducer that would not only generate a high frequency pulse, but focus and control it as well.

CONCEPT AND CONSTRUCTION

It was believed that if sound could be made to follow a column of mercury vapor, which could in turn be concentrated into a fine beam, the resultant pulse would be focused. In order to concentrate the mercury vapor, it was allowed to fill the inside of an insulated cylinder, while at the same time, a charge of negative electricity at six volts was induced. Around the outside of the cylinder, fine copper wire was wrapped, and a like charge of variable voltage was passed through it. As the negative charge on the outside of the container opposed the negatively charged mercury vapor, the vapor was caused to concentrate in a find pencil-like beam. By varying the intensity of the charge along the tube, the beam was made to decrease in diameter from the rear of the cylinder to the front.

The actual sound pulse was generated at the rear of the tube by a simple magnetic-type transducer. For frequencies in excess of 50 kc., crystal transducers were used. Once generated, the sound pulse followed the mercury vapor with little loss to the surrounding air within the tube. Due to the relatively large mass of the mercury vapor, the sound pulse attained a fairly high momentum which proved to be of value in later experiments.

EXPERIMENTAL

Actual construction of the device required approximately two months. The next step was the experimental analysis of the effects of high-frequency sound on metals, crystals, and a variety of other materials. The most interesting results were obtained when hard metals, such as nickel-steel and tungsten were exposed to frequencies of 40 to 70 kc. Crystallization took place and, in one case, a razor blade was actually reduced to powder. When objects containing any degree of moisture were brought into the path of the high-frequency sound, they immediately burst into flames or were vaporized. Glass was shattered at a wide variety of frequencies ranging from as low as 20 kc. to as high as 90 kc. As a variable output audio oscillator was used in many experiments, a multiplicity of frequencies were obtainable.

APPLICATIONS

There are a great many applications for sound. In the field of metallurgy, hypersonic beams may serve to discover the weaknesses of metals, so that new and stronger alloys might be developed. In crystallography, high-frequency sound may be used to stimulate the formation of new and undreamed of crystal patterns. In fact, it is conceivable that sound might one day be used to cut, with great precision, extremely hard materials.

The Effects of Varying Wave Lengths of Light on Chromosome Breakage

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Can the light we live under affect growth, determine sex, or cause disease? This was the question in my mind, and to investigate it, Drosophila melanogaster, commonly called the fruit fly, was chosen to be used due to its reproductiveness and ease in raising qualities. The main purpose was to see if varying wave lengths of the spectrum affected chromosome breakage or chromosome malfunction.

PROCEDURE

The flies were obtained from the University of Wisconsin Genetics Laboratory and were kept in culture vials containing culture medium. The medium was prepared from water, agar, Karo syrup, and cornmeal. To inhibit mold growth, the medium was seeded with methyl-p-hydroxybenzoate in solution with 95% alcohol.

Wild-type or normal flies were then placed in fresh culture vials at 68° F. and were irradiated 16 hours a day for ten days. Spectro-radioscopic filters, were used to provide the various wave lengths of light with the light source at a distance of 18 inches from the filter.

RESULTS

After the hatch had fully come, the new generation was etherized and the results were noted.

Group A, which received infra-red light of 10,000 angstrom units, had a normal hatch with no major abnormalities.

Group B, which received red light of 6500 angstrom units, became inactive and after two days of irradiation the parent flies died. Upon investigation, their tissue cells were found to rupture, hemorrhage, and die.

Group C, which received yellow light of 5800 angstrom units, had no major abnormalities.

Group D, which received green light of 5200 angstrom units, had no major abnormalities.

Group E, which received blue light of 4700 angstrom units, had a normal hatch but was very hyperactive with several different mutations present, and upon investigation of their tissue cells, it was found that the cell went into a boiling action before it died.

Group F, which received ultraviolet light of 3000 angstrom units, hatched with 97% of the hatch being males and 30% of these were white-eyed, a mutation caused by chromosome breakage.

CONCLUSIONS

It therefore appears that red light causes a chromosome malfunction and cell deterioration; blue light causes chromosome breakage during mitosis and hyperactivity of the tissue cells; and ultraviolet light affects a chromosome breakage in sex differentiation and the gene-causing white-eyed flies. This evidence, which did hold true for further generations, could possibly give a hint as to why extended exposure to artificial light helps cause skin cancer.

Response of Planaria to Instrumental Learning

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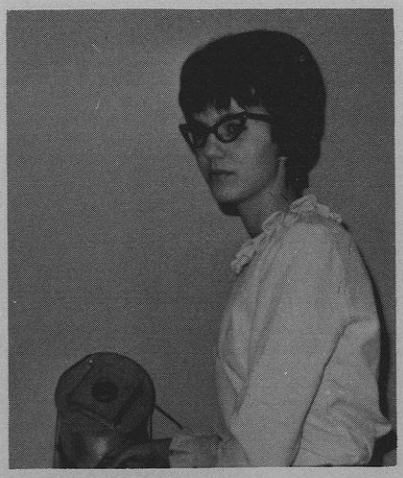


Worm research began in 1955 when James McConnell and Robert Thompson, at the University of Texas, showed that planaria were capable of learning classical conditional responses. The purpose of this study was to show that instrumental learning could be transferred in worms just as the conditioning process can be transferred in worms.

Instrumental learning differs from classical conditioning in that the animal is trained to do something in order to get or avoid something. Thus whether the animal is reinforced by punishment or reward depends on its response.

Maze learning, in which the animal is punished for making the wrong choice of alternative paths or rewarded for making the correct choice, is an example of instrumental learning.

APPARATUS

The apparatus used in this experiment was an adaptation of the situation developed by Irvin Rubenstein and Jay Boyd Best. It was a simple maze consisting of 3 identical cylindrical wells connected by a symmetrical Y-shaped tunnel. The entire maze was built of clear acrylic plastic, and was equipped with lights so that the wells could be illuminated individually. Each well could be made to appear bright, dimly lighted, or dark.

EXPERIMENTAL

In this experiment, the Dugesia variety of planaria was used. For a training trial, the same procedure developed by Rubenstein for his apparatus was used. The maze would be filled with water and a worm would be place in it. Upon withdrawal of the water from the maze, the worm would enter one of the wells and crawl into the Y-shaped tunnel looking for water. When the worm was securely in the tunnel, the well connecting one fork of the tunnel directly ahead of the worm was brightly illuminated and that connecting the other fork was totally darkened. If the worm chose the lighted one, water was withheld and the lights were again switched around so that it again had to make a choice between the darkened and the brightly illuminated well. Following the correct choice, all the wells were switched to dim illumination and the worm was allowed to play in the water-filled maze for five minutes. It would then be put through another trial in the same way.

To eliminate any systematic coincidence of right-left choice between worm and the experimenter, the well to be darkened and the well to be illuminated was determined by the toss of a coin. Half the worms were trained to go to the darkened rather than lighted wells. After 6-12 trials (an hour's time), the worm was put back into a cup-like bowl filled with spring water, which served as its home. It was put through a training session every other day.

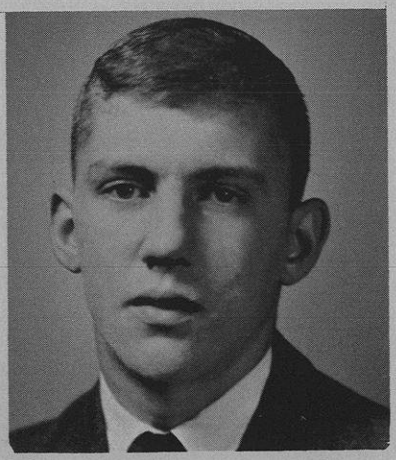
The amount of retention as measured by the reduction in training trials is known as a savings. In this experiment, four groups of planaria and their savings were compared to trained normal planaria. They were trained planaria cut into two portions forming two groups: (1) planaria with regenerated tails; (2) planaria with regenerated heads; (3) starved planaria fed pieces of trained planaria, and (4) starved planaria fed pieces of untrained planaria. The comparisons and results of these groups are found in the accompanying table.

The comparison and results of the amount of retention of learning as measured by the reduction in training trials (savings) of different groups of planaria.

Group →	I Normal	II Regenerated Heads	III Regenerated Tails	IV Cannibals of Learned	V Cannibals of Unlearned
Savings	0	3	5	7	0
Time (hrs.)					
Dark	15	12	10	8	15
Bright	18	15	13	11	18

(contd. on p. 41)

The Effects of Low-Calorie Soft Drinks on Human Teeth



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The problem which presented itself, and which was used as a science project, concerned the effects of low-calorie soft drinks on human teeth. This problem came about due to claims by soft drink manufacturers concerning their products and teeth.

Analysis of three brands of dietetic soft drinks showed them to contain carbonic acid; phosphoric acid; water; artificial flavor and color; and saccharin, an artificial sweetener. pH tests showed the acidity of all three brands to be very strong.

Analysis of three brands of sugar-sweetened soft drinks showed that they contained carbonic acid; phosphoric acid; water; artificial flavor and color; and sugar, the only major ingredient which the dietetic brands did not have. Quantities of these ingredients varied according to manufacturer's specifications to produce unique and different tastes.

Teeth were found to consist of three layers: enamel, dentin, and periosteum. The enamel is composed entirely of inorganic materials - calcium salts: CaF and $Ca_3(PO_4)_2$ - and is the only naturally exposed part of the tooth.[2] The dentin is composed of inorganic structures providing a framework for organic material (nerves, blood vessels) in the interior of the tooth. The periosteum encases the root of the tooth, and is composed mainly of organic material.

HYPOTHESIS

A hypothesis was formed: "Low-calorie, carbonated soft drinks and sugared carbonated soft drinks have the same damaging effects on human teeth, both subjecting teeth to the corrosive action of carbonic and phosphoric acids, as in the following equations:

$$Ca_3(PO_4)_2 + 3H_2CO_3 \rightarrow 3CaCO_3 + 2H_3PO_4 \quad \text{(Eq. 1)}$$

$$3CaF_2 + 2H_3PO_4 \longrightarrow Ca_3(PO_4)_2 + 6\,HF \quad \text{(Eq. 2)}$$

Carbonic acid unites with calcium phosphate in the enamel to form calcium carbonate and phosphoric acid (Eq. 1). Phosphoric acid reacts with calcium fluoride to form calcium phosphate and hydrogen fluoride (Eq. 2). This calcium phosphate further reacts with carbonic acid as in Equation 1."

EXPERIMENTAL

To prove this hypothesis, healthy, recently extracted human teeth were obtained from my family dentist. These teeth were carefully cleaned with hydrogen peroxide, then each placed in a large beaker. Three beakers were filled with dietetic brands and three others with sugared brands. Teeth were submerged in fresh-from-the-bottle pop for different lengths of time, ranging from one hour to 48 hours. These experiments were run three times. Each time the results were the same: corrosion of the enamel, exposure and decay of the dentine and periosteum of all the teeth.

These results proved that the harm inflicted on human teeth by carbonated soft drinks is directly caused by the corrosive action of the acids in the beverage. The results showed beyond a doubt that dietetic and sugared, carbonated soft drinks have the same corrosive effects on teeth.

CONCLUSION

A conclusion that can be drawn, perhaps, is that any strongly acidic beverage is harmful to teeth. To determine whether this might possibly be so, the above experiment was run again with orange juice, grapefruit juice, and lemon juice substituted for soft drink samples. These three juices contain citric acid in large percentages, and are very acidic. The results of these tests were much the same; the same corrosive action took place, but at a somewhat slower rate.

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A Modern Tesla Coil

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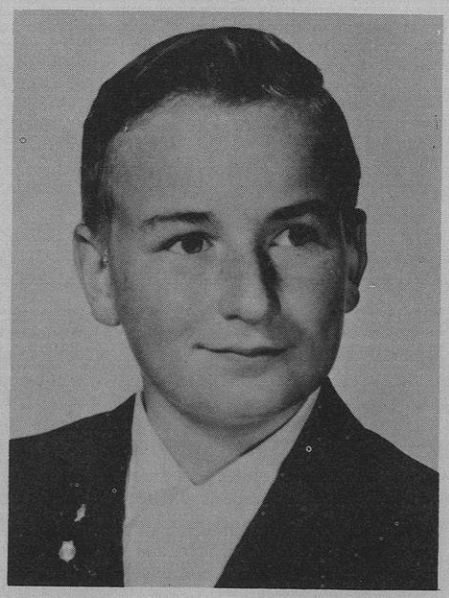

A Tesla Coil is basically a generator of high voltage at high frequency. The purpose of this experiment was to construct such a coil and study the effects of metal objects on corona discharge.

CIRCUIT

The circuit consists of two triodes in parallel plus a capacitor coil combination and power supply. Sixty cycle alternating current is introduced on the anodes. The circuit oscillates and produces a new signal at about five megacycles. The long tall coil acts as a trasformer and steps the voltage up to about sixty thousand volts. Bakelite and lucite were used for the form and the base in order to assure a high breakdown voltage.

EXPERIMENTAL

The discharge from the top of the coil, called corona discharge, has many properties, some of which were studied and recorded.

It was found that a wire suspended from the discharge point in a horizontal position caused the corona to appear at both ends of the wire. The reason for this is that radio frequency currents seem to seek the farthest point from the terminal before radiating.

If an object made of metal was brought near the corona, the current in the circuit dropped sharply and the corona arced over to the object.

A study of the loop attached to the discharge terminal was also made. It was noticed in this case that the direction of the corona discharge could be controlled by moving the loop around the terminal. In all cases the discharge appeared at nearly right angles to that of the loop.

A wire in the form of a ring with one end open was connected to the discharge terminal. The ends of the loop were suspended directly over the discharge point. In this case I observed that with the ends very close together there was a strong repulsion and that discharge appeared off each end in opposite directions.

CONCLUSIONS

(a) The radio frequency currents produced can and do travel short distances in air.

(b) Discharge of the corona under ordinary conditions along a wire will appear at its extreme ends.

(c) Two end points of a wire which are in the same plane repel each other and affect the discharge direction.

(d) The discharge point seems to be above ground with respect to an object not connected to it.

(e) Loops and bent wires have basically the same characteristics but each possess some unique traits.

(f) The current of the circuit is affected to some extent by the type of object attached to the discharge terminal.

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Chromatography and Electrophoresis

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Chromatography is a method of separating and identifying materials by the use of a moving solvent in a stationary medium. The materials to be analyzed are placed on the end of a piece of filter paper. That end is then placed in a solvent. By capillary action the solvent flows along the paper carrying with it all substances soluble in the liquid. The distance that different materials will travel is determined by two propelling and retarding forces. The propelling forces are the solvent flow and the solubility of the material. The retarding forces are adsorption and partition.

CHROMATOGRAPHY

The first experiments were simply to gain experience with the process. Inks were tested using a solvent of water, ammonium sulphate, and ethanol. The results were colorful and interesting. Different nitrates were then tested using a solvent of acetone, water, and HCl. The results gave characteristic ratios of the distance the nitrates traveled to the distance that the solvent traveled. With these figures an unknown nitrate could be determined using chromatography.

ELECTROPHORESIS

Electrophoresis is only an incomplete form of electrolysis. Paper electrophoresis consists of moistening a piece of filter paper with a buffer solution. This paper is place in an electric field and the material to be tested is placed in the middle of the paper. The charged elements of this material travel toward their respective charge. The two biggest factors in this process are the size of the ions and their charge.

Two practice experiments were run each using a mixture of N/10 acetic acid and N/25 ammonium acetate as the buffer. The materials tested were three chemical indicators and three organic dyes. The results showed the movement of positively and negatively charged particles and the lack of movement of neutral material.

APPLICATIONS

The main interest is in the analysis of blood. Using a buffer of pyridine, water, and acetic acid, tests were run on samples of my own blood, blood from two patients at the local hospital, and blood taken from a tumor on a rabbit. After staining the electrophoretograms for proteins, there seemed to be one protein present in all of the samples. The blood from the patients differed slightly from my blood. The rabbit's blood showed a spot which was not recognizable in any of the other papers. All of the above materials in the blood, with the exception of the above mentioned rabbit spot, were going toward the cathode.

In the future, work is planned with more extensive studies into animal and human blood relative to electrophoresis. Relative to chromatrography, studies pertaining to the effects of different conditions to the nitrate numbers are planned.

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Construction of an Adding Machine and Typewriter

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Every product has origination as a problem. One reason the problem of the adding machine and typewriter was developed was to gain knowledge of the procedure any company uses to develop an idea into a product.

PROBLEM

The construction problem was divided into four sections. The first problem solved was the circuit. Three circuits were designed to meet the need: one complex circuit for the addition and subtraction unit of the computer, and one complex circuit each for the multiplication and division units of the computer. These circuits employed a mechanical device which was mounted on the movable core of a solonoid. To solve the construction of the mechanical unit in the computer, a model was built from ideas and erector set parts. When developed, this model worked quite well.

Designing the metal parts in the computer proved to be the most difficult problem to solve. First, the mechanical unit was designed, followed by the designing of the typewriter unit and frame respectively, until the entire machine had been designed.

The last procedure required accuracy in making the parts designed. Accuracy to the nearest sixteenth of an inch was difficult in production. Often parts had to be designed as many as three times before a suitable part was made.

CONSTRUCTION

The power supply on the machine had an output of 12 amperes at 110 volts direct current. At the dials, this steady current changed into impulses. These impulses operated a solonoid which in turn operated the mechanical unit attached to its movable core. According to the quantity of impulses, the solonoid operated a sliding frame, working on the slide rule principle, to complete the correct circuit.

The typewriter unit had one solonoid for each number and one for spacing to operate the keys. This unit was equipped with an automatic carriage return, returning the carriage after a four-digit number had been typed. From push buttons on the control panel, the current was sent directly to the solonoids. By this method, a four-digit column could be typed from the control panel alone.

CONCLUSION

The conclusion was used to limit further development of the computer as a mechanical one. It was discovered that mechanical parts will only operate to the degree of accuracy in which they are constructed and take much more time in designing than stationary parts. This would prove the preferability of an electronic machine.

In the future, this machine would probably be used in calculating pi to any decimal value given the computer to solve. This computation will be too fast for a mechanical computer. Therefore, an electronic computer is more practical because there would be less work involved in designing the parts and this type of machine would be able to operate with greater speed.

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H_2S-Hydroquinone Solutions as Qualitative Cationic Reagents

MARGARET ANN BONERTZ

Assumption High School
445 Chestnut St.
Wisconsin Rapids, Wis. 54494

Sister Jean Marie, OSF, sponsor

The purpose of this analysis was to find a means of identifying metal ions using the S^{--} ion but without the disadvantages of H_2S gas.

To study the reactions of the metal ions in solution, a determining solution had to be prepared. An alcohol was saturated with hydroquinone crystals and H_2S gas was bubbled through the mixture to produce the reagent. The test solutions were added to 1 molar metal ion solutions and the precipitates of these were compared with those formed in solutions made acid with HCl, and with those formed in solutions made basic with NH_4OH. This pattern was also used in testing to differentiate between the several oxidation states of the metal ions.

PRELIMINARY RESULTS

Results showed that the alcoholic H_2S-hydroquinone solutions gave a specific qualitative test for many of the 23 metal ions tested. The identifying liquid was particularly specific for mercury, iron, silver and cadmium. A difference in precipitates was discerned between the oxidation states of mercury and iron, the silver ion produced a silver mirror effect and a yellow precipitate was produced with the cadmium ion. Therefore, since the alcoholic H_2S-hydroquinone solutions are specific for metal ions, it can be called a universal qualitative reagent.

QUALITATIVE TEST PAPERS

Due to these conclusions, it was thought that an analysis paper similar to lead acetate paper could be tested for qualitative value. In preparing this paper, long strips of filter paper were saturated with the alcoholic H_2S-hydroquinone solutions. The dried papers were then tested using several drops of the unaltered metal ion solution, several drops of metal ion solution acidified with HCl, and several drops of metal ion solution made basic with NH_4OH, respectively.

If exposed to air and normal temperatures for a period of time the test paper became dark brown and thus not useful for identifying purposes. However, if stored in an air-tight bottle or used soon after preparation, the analysis paper produced spots colored similarly to the precipitates given by the liquid solutions.

APPLICATION TO PAPER CHROMATROGRAPHY

In view of these test results, the properties of the alcoholic H_2S-hydroquinone solutions as developing agents for paper chromatography were examined.

A 1:1 solution of acetic acid and water was used to transport the 23 metal ions onto strips of chromatography paper. These strips were dried and then sprayed with the alcoholic H_2S-hydroquinone solutions.

Conclusions showed that as a developing agent for paper chromatography the liquid solution was not successful. The spots produced were weak or indistinquishable and thus not useful for measuring the R_f values.

District

AND

Regional

MEETING

REPORTS

The Junior Academy district and regional meeting reports and programs which appear on the following pages attest to the fact that many junior and senior high school students throughout Wisconsin are developing a keen interest in science through scientific inquiry.

Research presentations covered all aspects of science and mathematics--from learning studies to space medicine, and from a study of high-energy sparks to the study of the torus.

JUDGING CRITERIA

Each presentation was judged by a panel of experts representing each of the basic sciences. The criteria used for judging Junior Academy events are as follows:

Scientific thought	10	points
Scientific value	10	
Originality	10	
Technical skill	10	
Thoroughness	10	
Presentation	10	
Continued interest	3 1/3	
Time Limit	3 1/3	
Practicality	3 1/3	
Total	70	points

AWARDS

Senior High School Division winners were selected in three different groups: delegates to the Statewide Meeting, alternates to the Statewide Meeting, and honorable mentions.

Junior High School Division winners were designated as A or B.

All winners in both divisions received their choice of a one-year subscription to a scientific periodical. This year 78 subscriptions were awarded at a cost exceeding $350.00.

SUMMARY

A total of 211 junior and senior high school students made research presentations at the thirteen meetings held this year. Of those students making presentations, their grade classification was as follows:

21.8%	- 12th graders
16.6	- 11
11.4	- 10
23.7	- 9
16.1	- 8
8.5	- 7
1.9	- Unknown

Sixty-five different schools located in 41 cities throughout the state were represented at the various meetings.

ABSTRACTS

OF THE

PAPERS PRESENTED

AT THE

DISTRICT and REGIONAL MEETINGS

ARE AVAILABLE

FROM THE

JUNIOR ACADEMY OFFICE
EXTENSION DIVISION
UNIVERSITY OF WISCONSIN
MADISON, WISCONSIN 53706

Kenosha - Racine District

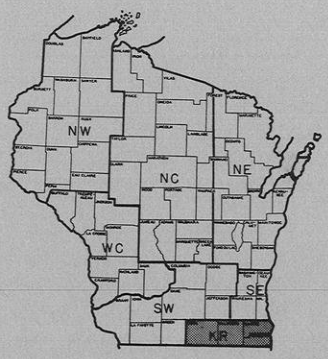
Badger High School, Lake Geneva, was the site of the April 18th meeting of the Kenosha-Racine District. Under the competent chairmanship of Donald W. Carter, 13 students representing 3 high schools in three district cities gave research presentations before judges: Dr. Clare Kenaga, Geneva Bay Estates, Lake Geneva; Dr. Neal Markham, 185 N. Franklin St., Whitewater; Mr. Wallace Menki, Engineering Dept. HEVI-Duty Electric Co., Lake Geneva.

WINNERS

Among those students making presentations, the following were chosen by the judges to represent the district at the Statewide Meeting: Barbara A. Behnke, Mary D. Bradford High School, Kenosha; David W. Moldenhauer, Badger High School, Lake Geneva; Randall B. Jensen, Mary D. Bradford High School, Kenosha. Mr. Jensen was unable to participate at the State Meeting.

Alternates were: Richard E. Fons, Washington Park High School, Racine, first; Gerald J. Hujik, Mary D. Bradford High School, Kenosha, second; Marvin L. Meister, Badger High School, Lake Geneva, third.

Honorable mention awards went to Jeffrey M. Reilly and Mary K. Spraker of Mary D. Bradford High School, Kenosha.



DISTRICT COMMITTEE

Members of the district committee included: Donald W. Carter, Badger High School, (Chairman, 1962-64); Malcolm Albey, Central High School, Salem; Mary A. Doherty, Mary D. Bradford High School, Kenosha; Edward F. Gueth, Janesville Senior High School.

Upon the retirement of Donald W. Carter as district chairman, Mr. Ronald P. Nicolazzi, Mary D. Bradford High School, Kenosha, has agreed to preside as chairman of the district committee.

Kenosha-Racine District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 18, 1964
Badger High School
Lake Geneva

Presiding: Mr. Donald W. Carter, Badger High School, Lake Geneva.

Welcome: Mr. Karl Reinke, Principal, Badger High School, Lake Geneva.

JAMES E. ANGLIN, Junior, Bradford High School, Kenosha; Depicting Sound Waves Produced by Fish with a Piezoelectric Hydrophone Unit.

BARBARA A. BEHNKE, Senior, Bradford High School, Kenosha; Thin-Layer Chromatography in the Determination of Sugar in the Urine.

DOLORES A. ERSKINE, Sophomore, Bradford High School, Kenosha; Biotransformation: The Liver and Its Role.

RICHARD E. FONS, Senior, Washington Park High School, Racine; Root River Water Analysis.

ROBERTA J. HIX, Junior, Bradford High School, Kenosha; The Case of the Puffing Paramecium.

GERALD J. HUJIK, Senior, Bradford High School, Kenosha; Qualitative Analysis of the Inorganic Compounds in Bones.

RANDALL B. JENSEN, Senior, Bradford High School, Kenosha; Benard Cells.

MARVIN L. MEISTER, Freshman, Badger High School, Lake Geneva; Preparation of an Articulated Skeleton of a Dog.

DAVID W. MOLDENHAUER, Junior, Badger High School, Lake Geneva; Adding Machine and Typewriter.

JEFFREY M. REILLEY, Junior, Bradford High School, Kenosha; Analysis of Quincunx.

LINDA M. SCHMELLING, Sophomore, Bradford High School, Kenosha; Diatoms and Their Importance.

CARL F. SCHROEDER, Junior, Bradford High School, Kenosha; Aerodynamic Design of Automobiles.

MARY K. SPRAKER, Sophomore, Bradford High School, Kenosha; Phenomena of Surface Tension.

North Central District

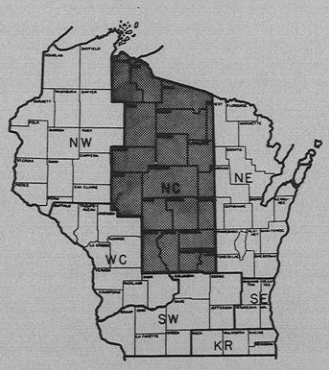
Zeta Chapter of Sigma Zeta, national science fraternity, again hosted the North Central District Meeting at Wisconsin State University-Stevens Point on April 18th. Mr. Richard Marchiando, a student at WSU-Stevens Point, presided over the sessions at which 11 students made presentations. These students were from 4 different schools representing four cities in the district.

JUDGES

Faculty members from WSU-Stevens Point served as judges. They were: Robert Weaver, Chemistry Department; Benedict Oh, Physics Department; and John Barnes, Biology Department.

WINNERS

The judges selected the following students to represent the district at the Statewide Meeting: Margaret A. Bonertz, Assumption High School, Wisconsin Rapids; John R. Boyarski, Assumption High School, Wisconsin Rapids; and Perry M. Nealis, Columbus High School, Marshfield.



First, second and third alternates, respectively, were: Cathy A. Precourt, Maria High School. Stevens Point; Terry J. Hastreiter, Columbus, High School, Marshfield; Michael J. Stensberg, Assumption High School, Wisconsin Rapids. (contd. on p. 41)

North Central District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 18, 1964
Science Building
Wisconsin State College
Stevens Point

Presiding: Richard Marchiando, Wisconsin State College, Stevens Point.

Welcome: Mr. O. A. Andrews, Assistant Professor of Chemistry, Wisconsin State College, Stevens Point.

MARGARET L. BARRETT, Junior, Assumption High School, Wisconsin Rapids; Determination of the Proportions of Gas Absorbed in the Clathrate Crystal.

MARGARET A. BONERTZ, Senior, Assumption High School, Wisconsin Rapids; Qualitative Analysis of Metal Ions by Means of Alcohol - Hydroquinone - H_2S Solutions.

JOHN R. BOYARSKI, Junior, Assumption High School, Wisconsin Rapids; A Modern Tesla Coil.

JEANNE M. GRUBER, Junior, Assumption High School, Wisconsin Rapids; Polarity and Bond Classification.

TERRY J. HASTREITER, Junior, Columbus High School, Marshfield; Analysis With a Home - Built Spectroscope.

MARY A. HENTSCHEL, Junior, Assumption High School, Wisconsin Rapids; A Comparative Study of Normal, Double, and Complex Salts.

DEAN L. KIRSCHLING, Junior, Assumption High School, Wisconsin Rapids; A Study of the Properties of Plastic.

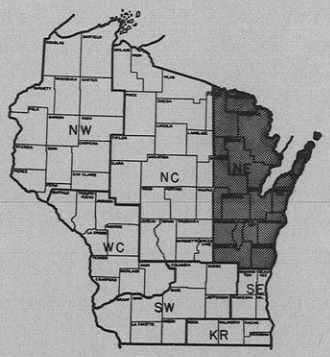
GREGORY K. LARSON, Senior, Medford High School; Isolation of Biologically Active Compounds in Insects.

PERRY M. NEALIS, Junior, Columbus High School, Marshfield; Photo Effects on the Behavior of Human Spermatozoa.

CATHY A. PRECOURT, Junior, Maria High School, Stevens Point; Number Patterns of Perfect Numbers.

MICHAEL J. STENSBERG, Senior, Assumption High School, Wisconsin Rapids; A Lattice Geometry in the Polar Coordinate System.

Northeast District



About 150 persons attended the Northeast District Meeting of the Junior Academy at Lawrence College, Appleton, on April 11th. Robert Davidson, district chairman was assisted by George Sylvester and Kay Davidson who introduced each presentation. Twenty-three students gave presentations. They represented seven schools located in five cities in the district.

Judges for the meeting were from Appleton. They were: Kent A. Huber, Lawrence College; H. D. Potter; and Dr. Robert Rosenberg.

WINNERS

Selected by the judges to represent the district at the Statewide Meeting were: Lary J. Kilton, South High School, Sheboygan; Emerson C. Clarke, Lourdes High School, Oshkosh; and James W. Dwyer, South High School Sheboygan.

Lary J. Kilton being unable to present his work at the Statewide Meeting was replaced on the state meeting program by first alternate Karen J. Kuester, South High School, Sheboygan. Others receiving recognition were: Karen K. Couillard, Kimberly High School, second alternate; and Kay E. Davidson, Kimberly High School, third alternate.

Honorable mention awards went to: Eric C. Roehl, Appleton Senior High School; Randy D. Kuchenbecker, Fox Valley Lutheran High School, Appleton; Bill S. Schuster, Lourdes High School, Oshkosh; and George Sylvester, Kimberly High School.

DISTRICT COMMITTEE

The following teachers make up the district committee: Bjorn Christenson, De Pere High School; Sister M. Clara, St. John High School, Little Chute; Robert Davidson, Kimberly High School (Chairman, 1962-64); Sister M. Evelyn, St. Mary High School, Menasha; Edward C. Schleg, Sevastopol High School, Sturgeon Bay; Charles W. Scribner, Appleton Senior High School; Robert E. Showers, East High School, Green Bay; Roy D. Wentzel, Kaukauna High School; and Michael J. Wisnoski, Farnsworth Junior High School, Sheboygan.

New committee appointments include: Raymond D. Larson, South High School, Sheboygan; Helene Dedrick, Lincoln High School, Manitowoc; and Brother Edward Paulian, Lourdes High School, Oshkosh.

Northeast District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 11, 1964
Science Hall - Lawrence College
Appleton

Presiding: George Sylvester and Kay Davidson. Kimberly Senior High School.

GAIL M. BELLINGHAUSEN, Junior, Xavier High School, Appleton; The Effects of a Growth Stimulus on Chick Embryos.

EMERSON C. CLARKE, Sophomore, Lourdes High School, Oshkosh; Biological Clocks: Photoperiodism in Mice.

KAREN K. COUILLARD, Junior, Kimberly Senior High School; Life Span of Fruit Flies With Different Characteristics.

KAY E. DAVIDSON, Junior, Kimberly Senior High School; Valance Bonding and Paramagnetism.

JAMES W. DWYER, Senior, South High School, Sheboygan; The Therapeutic Uses of Bacteriophage in Epidermal Infections in Rats.

LARY J. KILTON, Senior, South High School, Sheboygan; Gravitational Force.

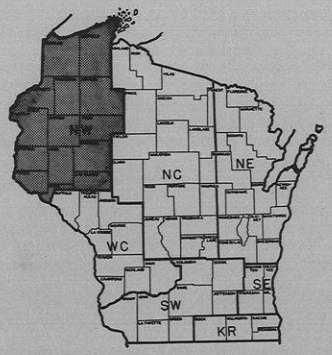
RANDY D. KUCHENBECKER, Junior, Fox Valley Lutheran High School, Appleton; The Tesla Coil.

KAREN J. KUESTER, Junior, South High School, Sheboygan; The Effects of Ultraviolet Light on the Growth Potential of Escherichia coli.

ROBERT F. NOWACKI, Junior, Lourdes High School, Oshkosh; Testing the Kendall System of Developer Classification.

(contd. on p. 41)

Northwest District



The northernmost meeting of the Junior Academy was held at Rice Lake High School on March 21st under the chairmanship of Thomas J. Ritzinger. Twenty students from seven schools made presentations at the day-long sessions with six cities represented on the program. Mr. Willard Swanson, Principal, Rice Lake High School, gave the welcoming address. Participants and teachers enjoyed a fine luncheon at a local cafe at which the luncheon speaker, Dr. Roger Aagard, Honeywell Research Group, Hopkins, Minnesota, spoke on "The Operation and Uses of Lasers."

Judges for the meeting were: Prof. Perry Luchsinger, Chemistry Dept., WSU-Eau Claire; Dr. S. F. Sun, Mathematics Dept., Northland College, Ashland; and Prof. Theodore Setterquist, Chemistry Dept., WSU-River Falls.

WINNERS

Students selected by the judges to represent the district at the Statewide Meeting were: Wayne R. Kirkham, Rice Lake High School; Marilyn A. Langer, Regis High School, Eau Claire; and Elric W. Saaski, South Shore High School, Port Wing.

Alternates were William H. Carlson, Central High School, Superior, first; Ronald D. Krippner, Regis High School, Eau Claire, second; and Thomas B. Hendrickson, Regis High School, Eau Claire, third.

Honorable mention was given to two students from Superior: Eileen Lagae, Cathedral High School; and J. Nicholas Schweitzer, Central High School.

DISTRICT COMMITTEE

District committee members include: Sister M. Georgette, Cathedral High School, Superior; Jerome Isaacs, Chetek High School; LeRoy Kingsbury, Turtle Lake High School; Glen Parish, East High School, Superior; Thomas J. Ritzinger, Rice Lake High School (Chairman, 1962-64); Clarence Rushman, McDonell High School, Chippewa Falls; Sister M. Valerian, Regis High School, Eau Claire; and Dane L. Watrud, Elk Mound High School. Joseph Kubala, Cathedral High School, Superior, was elected as district chairman for 1964-66.

Northwest District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
March 21, 1964
Rice Lake High School
Rice Lake

Presiding: Mr. Thomas J. Ritzinger, Rice Lake High School.

Welcome: Mr. Willard Swanson, Principal, Rice Lake High School.

VAL R. BAERTLEIN, Sophomore, Cathedral High School, Superior; Studies on the Purification of Water by Freezing.

MICHAEL J. BUCHANAN, Senior, McDonell High School, Chippewa Falls; Investigation into the Principles and Practical Applications of the Hydraulic Ram.

WILLIAM H. CARLSON, Senior, Central High School, Superior; Modulation of a Light Beam.

BRUCE HARSTAD, Freshman, Prairie Farm High School; Lichen Laboratory.

WALTER C. HEBERT, Senior, McDonell High School, Chippewa Falls; Similarities in Wave Behavior.

THOMAS B. HENDRICKSON, Sophomore, Regis High School, Eau Claire; A Complete Balance of Life.

SANDRA M. JOHNSON, Senior, McDonell High School, Chippewa Falls; A Study of the Photoelectric Effect and Measurement of Planck's Constant.

WAYNE R. KIRKHAM, Senior, Rice Lake High School; The Relative Biological Effectiveness of Varying Wave Lengths.

SANDRA L. KRAMSCHUSTER, Senior, McDonell High School, Chippewa Falls; The Basic Principle of the Hammond Organ.

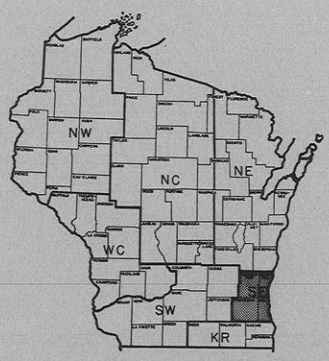
RONALD D. KRIPPNER, Junior, Regis High School, Eau Claire; Permeability of Roots Obtained Through Hydroponics.

GREGORY F. KUBALA, Freshman, Cathedral High School, Superior; The Effect of Nagative Air Ions on the Disposition of Mice.

(contd. on p. 42)

Southeast District

Twenty-eight students from 11 schools, four different cities, in the Milwaukee area made presentations at one of the four concurrent sessions of the Southeast District Meeting held at Milwaukee Lutheran High School on April 4th. The welcoming address was given by Richard C. Schneider, Milwaukee Lutheran High School, who presided over the meeting. He deserves much of the credit for a well-organized meeting. Assisting Mr. Schneider at the sessions were five of his fellow teachers. They were: Mr. Kenneth Bahr; Mr. Ralph Kohrs; Mr. Norman Kowert; Mr. Maynard C. Krause; and Mr. Curtis Teetzen.



JUDGES

Judges for the four sessions included: Sisters M. Thomasine and M. Felice, Mount Mary College; Messrs. Roland Lesniewski and John Sonnemann, Paul Lewis Laboratories; Mr. Glenn Svoboda, Freeman Chemical Co.; Mr. Thomas Brewer, G. E. X-Ray; Mr. John Britt, A C Spark Plug-General Motors; Messrs. Lew Balkman and Phil Cramton, Wisconsin Telephone Co.; Mr. Emil Petrusek, Paul Lewis Laboratories; Prof. Stanley Krupnik, Marquette University; Dr. Ernest Bellis, University of Wisconsin-Milwaukee; and Sister Evelyn, St. Mary High School, Menasha.

District delegates to the Statewide Meeting of the Junior Academy were selected by the judges. They include: John W. Halvorson, Custer High School (biology); John R. Hill, Rufus King High School (physics); John T. Friedrich, Milwaukee Lutheran High School (chemistry); and Gerald W. Baumann, Custer High School (mathematics).

John Friedrich, unable to participate at the State Meeting, was replaced on the program by his alternate in chemistry, Erich Marquardt, Waukesha High School.

The other alternates selected were: Allen R. Sells, Waukesh High School (biology); Robert J. Ascott, Washington High School (mathematics); and Thomas D. Poppendieck, Nicolet High School (physics).

Honorable mention awards went to Dennis L. Matthies, Wauwatosa West High School for his work in physics and Robert W. Schraml, Milwaukee Lutheran High School for his presentation in chemistry.

DISTRICT COMMITTEE

Teachers included on the district committee are: Catherine G. Collins, Custer High School; Jerome H. Fischer, Nicolet High School; Anne E. Goyette, St. Joan Antida High School; Robert H. Grogan, Milwaukee Public Schools; Sidney S. Jacobson, Waukesha Junior High School; Leonard B. Johnson, Rufus King High School; Jerome Kopecky, John Marshall High School; G. Camille Oliver, Washington High School; Richard C. Schneider, Jr., Milwaukee Lutheran High School (Chairman, 1963-65); and Fred Wood, Audubon Junior High School.

Southeast District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 4, 1964
Milwaukee Lutheran High School
Milwaukee

Presiding: Mr. Richard C. Schneider, Milwaukee Lutheran High School.

Biology Section

JOHN W. HALVORSON, Junior, Custer High School, Milwaukee; Creating a Bleeding Heart Platy.

DENNIS E. JAKUBOWSKI, Senior, Messmer High School, Milwaukee; Detergent Pollution in Brewing Water.

DON G. KOEPSELL, Senior, Nicolet High School, Milwaukee; The Juvenile Hormone and Its Effect on Insect Metamorphosis

ALLEN R. SELLS, Senior, Waukesha High School; The Remissive Characteristics of $Co(NO_3)_2$ In L1210 Leukemia.

Chemistry Section

STUART D. AUGUSTIN, Junior, Washington High School, Milwaukee; Foam Concentration of Ions.

JON D. FISCHER, Senior, Nicolet High School; Milwaukee; An Investigation of the Relationship of the Carbon Dioxide Content of One's Lungs as a Function of Time After Inhalation and Physical Exercise.

JOHN T. FRIEDRICH, Senior, Milwaukee Lutheran High School; Birth of Wisconsin's Largest American Elm.

HOWARD L. HICKMAN, Senior, Boys Trade and Technical High School, Milwaukee; Wood to Sugar.

(contd. on p. 42)

Southwest District

The Southwest District Junior Academy Meeting was held on the afternoon of April 11th at the Williams Field House, Wisconsin State University-Platteville, under the chairmanship of Laverne G. Weidler, WSU faculty member. During the morning students and visitors had the opportunity to view entries in the Southwestern Wisconsin Science Fair.

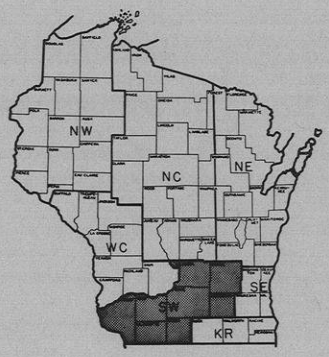
The afternoon session of research reports was presented before judges Glen Gundy, Dean Schneider, Roy Shaver, and Russel Wagner, all members of the Wisconsin State University faculty. Laverne G. Weidler presided over the meeting at which 8 students from two district schools gave presentations.

WINNERS

Selected by the judges to represent the district at the Statewide Meeting were: Greg D. Olson, Richland Center High School; Judy C. Vinger and John D. Wasserstrass, Monroe Senior High School.

DISTRICT COMMITTEE

District committee members are: John D. Curnow, Richland Center High School; Onan Eide, Shullsburg High School; Raymond B. Staley, Winnequah School, Madison; Jerome Traughber, Horicon High School; and Laverne G. Weidler, WSU-Platteville (Chairman).



Southwest District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 11, 1964
Wisconsin State College
Platteville

JACYN BAKER, Sophomore, Richland Center High School; Simple, Conjugated, and Derived Proteins.

BARBARA HANSEN, Senior, Richland Center High School; Synthesis of Amino Acids.

JOHN R. MORE, Junior, Richland Center High School; Electrolysis.

RICHARD L. OBORN, Sophomore, Richland Center High School; Experimentation into the Feasibility of a Closed Ecological System for Manned Space Flight.

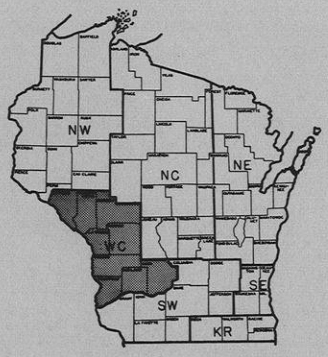
GREG D. OLSON, Sophomore, Richland Center High School; Experimentation into the Feasibility of a Closed Ecological System for Manned Space Flight.

RACHEL G. TAFT, Freshman, Richland Center High School; Functioning of Kidney Tubules in Goldfish.

JUDY C. VINGER, Freshman, Monroe Senior High School; Heredity of Planaria.

JOHN D. WASSERSTRASS, Junior, Monroe Senior High School; INDEMETRY: Inter-Dimensional Measure.

West Central District



Many students and teachers gathered together at La Crosse Central High School on April 11th to enjoy the presentations of 11 students representing four schools in the district. Sister M. Agnese, Aquinas High School, was chairman of the meeting with John Feroe, Central High School presiding. The judges for the day-long meeting were: James Bice, Vocational School, La Crosse; Laura A. Schuh, Biology Dept., WSU-La Crosse; and Mervin Eid, Central High School, La Crosse.

WINNERS

David Colbert, Sparta High School; John Feroe and Paul A. Van Akkeren, Central High School, La Crosse were chosen by the judges to represent the district at the Statewide Meeting.

Alternates selected were: William E. Wheeler, Viola High School, first; Robert J. Muraski, Sparta Senior High School, second; and Joseph C. Porter, Viola High School, third.

DISTRICT COMMITTEE

Chairman of the WC District Committee for 1962-64 was Sister M. Agnese, Aquinas High School, La Crosse. Assisting her on the committee were: Armin Grossfeld, Logan Junior High School, La Crosse; Lloyd Haville, Sparta High School; Lawrence A. Nutter, Central High School, La Crosse; and Rev. John M. Scott, Campion High School, Prairie du Chien.

Lawrence A. Nutter was selected as chairman of the West Central District Committee for 1964-66.

West Central District Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 11, 1964
Central High School
La Crosse

Welcome: Mr. Willard W. Hanson, Principal, Central High School, La Crosse.

MERLIN J. BERNAMANN, Senior, Sparta Senior High School; Construction and Theory of a Short Wave Transmitter.

DAVID A. COLBERT, Senior, Sparta Senior High School; Effects of Dietetic Soft Drinks on Human Teeth.

JOHN A. FEROE, Senior, Central High School, La Crosse; Chromatography and Electrophoresis.

LINDA S. HALL, Sophomore, Sparta Senior High School; Allergies in White Mice.

FRANK J. HULL, Junior, Campion High School, Prairie du Chien; Thermoelectric Effects.

JAMES H. LUECK, Freshman, Campion High School, Prairie du Chien; Meteorology of Today.

ROBERT J. MURASKI, Sophomore, Sparta Senior High School; Solar Energy Control Device.

JOSEPH C. PORTER, Junior, Viola High School; Evolutionary Theories.

PAUL A. VAN AKKEREN, Senior, Central High School, La Crosse; Effects of a Magnetic Field on a Living Organism.

WILLIAM E. WHEELER, Senior, Viola High School; The Study and Identification of Trees.

CHARLES F. ZIEL, Junior, Campion High School, Prairie du Chien; Jacob's Ladder and Construction.

La Crosse Region

The La Crosse Regional Meeting was held at Logan Junior High School, La Crosse on Saturday the 16th of May. The participating students and all who attended were welcomed by Mr. Monte Pelton, Principal, Logan Junior High School.

Mr. Armin Gossfeld, chairman of the meeting, reported that the meeting was a complete success. He was assisted by Mr. Terry Witzke, 7th grade teacher at Logan Junior High School.

Neil Sanders, student at Logan Junior High School, presided over the morning session at which nineteen students participated. They represented three different schools in La Crosse.

JUDGES

Judges for the event were Mr. Earl Kolcinski, Biology Teacher, Logan Senior High School and Mr. Kenneth Lindner, Department of Physical Sciences, Wisconsin State University-La Crosse. They chose three groups of winners which were designated A, B, and Honorable mention.

WINNERS

Those who received A awards were: Jennifer A. Soell, Campus School, WSU-La Crosse and Robert A. Black, Logan Junior High School.

B awards were given to: Sara V. Gundersen, Campus School, WSU-La Crosse and Carl H. Surom, Longfellow Junior High School.

Margaret E. Duffy, Campus School, WSU-La Crosse and Paul M. Moyer, Logan Junior High School received honorable mention.

La Crosse Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
May 16, 1964
Logan Junior High School
La Crosse

Welcome: Mr. Monte Pelton, Principal, Logan Junior High School, La Crosse.

ROBERT A. BLACK, Gr. 8, Logan Junior High School, La Crosse; Binary to Decimal.

MARGARET E. DUFFY, Gr. 8, Campus School, La Crosse; Breeding and Psychological Experiments Upon Cavies.

JANE A. ENTRINGER, Gr. 7, Logan Junior High School, La Crosse; Color Projector Which Adds and Subtracts Colored Light.

JUDY A. FORD, Gr. 7, Logan Junior High School, La Crosse; Development of Chicken.

MARK S. GRAHAM, Gr. 7, Logan Junior High School, La Crosse; How Your Telephone Works.

SARA V. GUNDERSEN, Gr. 7, Campus School, La Crosse; Embryology of the Chicken.

BRYAN L. HANKINS, Gr. 9, Logan Junior High School, La Crosse; The Raising of Bonsai Trees.

STEVE H. KERSTEN, Gr. 7, Logan Junior High School, La Crosse; How to Make a Telephone Transmitter.

PETER J. KRAUSE, Gr. 8, Logan Junior High School, La Crosse; A High Voltage Electric Arc Produced by an Induction Coil.

CAROL M. LARSON, Gr. 9, Longfellow Junior High School, La Crosse; The Effect of Nicotine and Tars on Two White Rats.

JANE LAYTON, Gr. 9, Longfellow Junior High School, La Crosse; Fallout Radiation and Protection.

IRVING J. LOCKETZ, Gr. 8, Longfellow Junior High School, La Crosse; Grinding a Six-Inch, F/8 Parabolic Mirror.

SHAWN D. MELBO, Gr. 9, Logan Junior High School, La Crosse; The Theory of the Cosmical Universe.

PAUL M. MOYER, Gr. 7, Logan Junior High School, La Crosse; How is Blood Pressure Measured?

LYNNETTE R. NOEL, Gr. 7, Logan Junior High School, La Crosse; The Little Roofing Nail Motor.

JAMES E. PERRY, Gr. 9, Campus School, La Crosse; Experimentation in Model Rocketry.

JENNIFER A. SOELL, Gr. 9, Campus School, La Crosse; The Effect of Thyroid Extract on the Cavy.

CARL H. SUROM, Gr. 9, Longfellow Junior High School, La Crosse; Simple Patio P.A. System.

ROBERT J. USTBY, Gr. 7, Logan Junior High School, La Crosse; Hydraulic Lift.

Madison Region

The Madison Regional Meeting was held on May 9th at Winnequah Junior High School under the capable chairmanship of Mr. Raymond B. Staley. Fourteen students participated from 5 different schools in the area. Opening remarks were given by Mr. Staley and Mr. Jack R. Arndt, Chairman, Wisconsin Junior Academy of Science. Presiding over the meeting was, Mike Hunter, a student at Winnequah Junior High School.

JUDGES

Judging the presentations were: Mr. Gerald Buck, West High School, Madison; Mr. Charles F. Sommers, Cherokee Junior High School, Madison; and Mr. Marvin F. Meissen, LaFollette High School, Madison.

WINNERS

Winning A awards were Jeffery A. Cook and James R. Runge from Jerstad-Agerholm Junior High School.

Margo Uphoff, Nichols Junior High School and Andy North, Winnequah Junior High School received B awards. Honorable mention was awarded to William H. Dornfeld, Horicon Junior High School and Kathy Van Lancher, Van Hise Junior High School.

Madison Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
May 9, 1964
Winnequah Junior High School
Monona

Presiding: Mike Hunter, Winnequah Junior High School, Monona.

Welcome: Mr. Raymond B. Staley, Winnequah Junior High School, Monona.

RICHARD W. BOYLE, Gr. 8, Nichols Junior High School, Monona; Carbon-Arc Furnace.

JEFFREY A. COOK, Gr. 9, Jerstad-Agerholm Junior High School, Racine; The Effects of Rocket Acceleration on Mice.

WILLIAM H. DORNFELD, Gr. 8, Horicon Junior High School; Nuclear Power Reactors.

WILLIAM F. FRAILEY, Gr. 8, Winnequah Junior High School, Monona; Animal Behavior.

CHARLES J. GIFFORD, Gr. 8, Nichols Junior High School, Monona; Radio Broadcaster/Amplifier.

ANDY S. HARRIS and OWEN M. LEVIN, Gr. 9, Jerstad-Agerholm Junior High School, Racine; Electron Tube Analysis.

JANE B. LUHMAN, Gr. 8, Winnequah Junior High School, Monona; Maze Learning in White Rats.

ANDY NORTH, Gr. 8, Winnequah Junior High School, Monona; The Effects of Pollution on Stream and Lake Habitats.

TOM J. OLSCHESKE, Gr. 8, Nichols Junior High School, Monona; The Trachtenberg Method of Mathematics.

JAMES J. RUNGE, Gr. 9, Jerstad-Agerholm Junior High School, Racine; Effects of Alcohol on Conditioned Reaction.

MARGO L. UPHOFF, Gr. 8, Nichols Junior High School, Monona; The Effect of Pollution on Fish.

LEA VANDERVELDE, Gr. 8, Nichols Junior High School, Monona; Photoelectric Cells.

CATHERINE M. VAN LANCKER, Gr. 8, Van Hise Junior High School, Madison; Embryo Development of the Chick.

DWIGHT L. WOLTER, Gr. 8, Nichols Junior High School, Monona; Kepler's Laws of Planetary Motion.

Milwaukee Region

Ten different schools were represented at the Milwaukee Regional Meeting held May 16th at Fritsche Junior High School, Milwaukee. The Regional Chairman, Mr. Fred Wood, Audubon Junior High School, did an excellent job of organizing the meeting.

There were 22 students participating in six sections that ran concurrently. A winner was chosen from each section.

JUDGES

Judging the six sections were: Mr. Kenneth Neusen, Hales Corners; Mr. Neal Eigenfeld, Mr. Gerald Fehr, Dr. Richard Haney, Mr. Kenneth Miller, and Miss Nancy Noeske all of Milwaukee.

WINNERS

Receiving the A award from each section were: Sue I. Might, Jerstad-Agerholm Junior High School; Richard J. Schuster, Starbuck Junior High School; Robin C. Schwant, Bell Junior High School; Gary E. Svoboda, Jerstad-Agerholm Junior High School, Nancy J. Westfahl, Bell Junior High School; and Ronald R. Wojnar, Walker Junior High School

Milwaukee Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
May 16, 1964
Fritsche Junior High School
Milwaukee

Presiding: Mr. Fred Wood, Audubon Junior High School, Milwaukee.

KERRY D. CHIPMAN, Gr. 7, Bell Junior High School, Milwaukee; The Influence of One Die on a Pair of Dice.

JAMES L. DAHLQUIST, Gr. 8, Starbuck Junior High School, Racine; Radioactive Fallout in Racine.

JEFF P. DAVIS, Gr. 9, Morse Junior High School, Milwaukee; Aerodynamics.

ROBERT J. DECESARI, Gr. 9, Fritsche Junior High School, Milwaukee; The Biochemical Fuel Cell.

JAMES R. EICHSTEDT, Gr. 9, Wright Junior High School, Milwaukee; Learning Systems in Computers.

DANIEL R. HERDEMAN, Gr. 7, Bell Junior High School, Milwaukee; The Effect of a Falling Pendulum on Obstructions in Its Path.

ALBERT E. KOEHLER, Gr. 9, Audubon Junior High School, Milwaukee; Design of Components for Digital Computers.

DEBORAH A. LANSBERRY, Gr. 8, Lincoln Junior High School, Waukesha; Composition of Blood.

SUE I. MIGHT, Gr. 8, Jerstad-Agerholm Junior High School, Racine; The Effect of Dye on the Yolks of Eggs.

KENNETH P. PAYNE, Gr. 8, Lincoln Junior High School, Waukesha; Rust, Smuts and Parasitic Growths.

SAM S. REEDY, Gr. 9, Nicolet High School, Milwaukee; The Effects of an Excessive Salt Diet.

STEVEN P. RICHTER, Gr. 8, Bell Junior High School, Milwaukee; Solar Cells and the Effect of Light on Their Characteristics.

DAVID E. SCHNEIDER, Gr. 7, Bell Junior High School, Milwaukee; Ellipses in Nature and in Math.

THOMAS C. SCHUNK, Gr. 9, Starbuck Junior High School, Racine; Urinalysis.

RICHARD J. SCHUSTER, Gr. 8, Starbuck Junior High School, Racine; The Electric Potential of a Nerve.

ROBIN C. SCHWANT, Gr. 7, Bell Junior High School, Milwaukee; Transfinite Numbers.

DANIEL D. SCROBELL, Gr. 7, Bell Junior High School, Milwaukee; Winter Heating Without an Humidifier.

CATHERINE S. STIKA, Gr. 8, Jerstad-Agerholm Junior High School, Racine; Heredity with Fruit Flies.

GARY E. SVOBODA, Gr. 9, Jerstad-Agerholm Junior High School, Racine; Mineral Analysis.

GEORGE K. UEMA, Gr. 7, Bell Junior High School, Milwaukee; Marbles in a Chain Reaction.

NANCY J. WESTFAHL, Gr. 7, Bell Junior High School, Milwaukee; Probability of Doubles Appearing on a Pair of Dice.

RONALD T. WOJNAR, Gr. 9, Walker Junior High School, Milwaukee; Visible Flow Wind Tunnel.

Rice Lake Region

The first Rice Lake Regional Meeting was held at Rice Lake High School on April 25th under the chairmanship of Mr. George Theis. Thirteen students from three schools presented their papers in a morning session. The meeting attracted student spectators from five additional schools and interested parents, bringing the attendance to about sixty.

Following the morning session a noon luncheon was served at a local hotel at which time Mr. Thomas J. Ritzinger, Rice Lake High School, gave a lecture-demonstration.

JUDGES

Judging the event were: Mr. William O. Reineke, Barron High School; Mr. James M. Stauffer, Rice Lake High School; and Mr. Robert Wanek, Spooner High School.

WINNERS

Receiving the A ratings for the meeting were: Diane Iverson, Ashland Junior High School and Mark Ehlers, Portwing Junior High School.

Sandra Fossum, Ashland Junior High School, and David Kristensen, Washington Junior High received B ratings.

Rice Lake Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
April 25, 1964
Rice Lake High School
Rice Lake

Presiding: Mr. George Theis, Washington Junior High School.

Comments: Mr. Jack R. Arndt, Chairman, State Junior Academy Committee.

KATHY E. BLAUBACH, Gr. 9, South Shore High School, Port Wing; Effect of Tobacco Tars on Epithelial Tissue of a Mouse.

STANLEY E. BODEEN, Gr. 9, South Shore High School, Port Wing; Mitosis.

RODERICK A. CAMERON, Gr. 8, Washington Junior High School, Rice Lake; Comparison of Time.

MARK G. EHLERS, Gr. 9, South Shore High School, Port Wing; Rate of Water Consumption of Plants.

VICTORIA R. ELONEN, Gr. 9, South Shore High School, Port Wing; The Development of the Chick Embryo.

SANDRA FOSSUM, Gr. 8, Ashland Junior High School; Oxygen Concentration Determination and Analysis.

KIRK W. GEBBIE, Gr. 8, Washington Junior High School, Rice Lake; Determination of the Rotation of the Earth on Its Axis.

BEVERLY A. GEORGE, Gr. 8, Washington Junior High School, Rice Lake; Chemical Reactions With Hydroponics.

DIANE L. IVERSON, Gr. 8, Ashland Junior High School; Temperature Analysis of a Bog Lake.

DAVID M. KRISTENSEN, Gr. 7, Washington Junior High School, Rice Lake; A Study of the Effect of Light on Fish.

SHIRLEY A. LARSON, Gr. 9, South Shore High School, Port Wing; Reconstruction of the Cat.

JOHN F. LEINO, Gr. 9, South Shore High School, Port Wing; The Preservation of the Developing Chicken Embryo.

DAVID V. SHUDLICK, Washington Junior High School, Rice Lake; The Computer Principle.

Sheboygan Region

Approximately twenty-five individuals from Sheboygan, Manitowoc and surrounding areas attended the Sheboygan Regional Meeting held at Farnsworth Junior High School on May 16th under the chairmanship of Mr. Michael J. Wisnoski. Although the participation was small, the quality of the presentations was excellent. Michael Sweeney and Matha Scheel, Farnsworth Junior High School, presided over the morning session.

JUDGES

The event was judged by the following: Mr. Don Danielson, Milwaukee; Messers. Ray Larson, Walter P. Lartz, and Ron Steckling, all of Sheboygan.

WINNERS

Michael P. Santell, Wilson Junior High School, received the A award. The B awards went to Martha S. Liebel, Urban Junior High School and Jeffrey R. Meissner, Farnsworth Junior High School.

Sheboygan Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
May 16, 1964
Farnsworth Junior High School
Sheboygan

Presiding: Michael Sweeney and Matha Scheel, Farnsworth Junior High School, Sheboygan.

MELANIE D. ARNST, Gr. 7, Farnsworth Junior High School, Sheboygan; How Weather Affects Paint.

GARY L. GEPHART, Gr. 8, Farnsworth Junior High School, Sheboygan; How Old is the Earth?

RONALD J. KENYON, Gr. 9, Farnsworth Junior High School, Sheboygan; Studies of Noncellular Protoplasm of Paramecium.

KAREN Y. KRAASE, Gr. 9, Farnsworth Junior High School, Sheboygan; How do Paramecia React to Different Types of Stimuli.

MARTHA S. LIEBL Gr. 9, Urban Junior High School, Sheboygan; The Role of Competition in Determining the Intensity of Natural Selection.

JEFFREY R. MEISSNER, Gr. 9, Farnsworth Junior High School, Sheboygan; Isolation, Identification, and Effects of Specific Plant Products on Frogs.

MICHAEL P. SANTELL, Gr. 9, Wilson Junior High School, Manitowoc; The Resistance Factor of Apple Juice.

GUS E. TIBORIS, Gr. 9, Farnsworth Junior High School, Sheboygan; Internal Tooth Changes Due to External Stimuli.

Wausau Region

The University of Wisconsin Extension Center at Wausau was the site of the Wausau Regional Meeting on May 9th. Regional chairman, Mr. Amos H. Yonke, science teacher at Horace Mann Junior High School, organized the meeting. Presiding over the meeting was Bob Johnson, Horace Mann Junior High School. Mr. Jerome Onheiber, University of Wisconsin Extension Center, Wausau, gave the welcoming address.

JUDGES

The task of judging the presentations was assumed by: Mr. Wayne Kleinschmidt, Mr. Robert Kusel, and Mr. Pat J. McKeough, all of Wausau.

WINNERS

Beverly Kundo, John Muir Junior High School; Christine J. Newman, Horace Mann Junior High School; and Patrick D. Chrouser, John Muir Junior High School were selected by the judges as A winners.

B winners included: Christine Meisenheimer, Washington Junior High School; John P. Dzubay and Jennifer L. Simpson both from Horace Mann Junior High School.

Wausau Regional Meeting
of the
WISCONSIN JUNIOR ACADEMY OF SCIENCE
May 9, 1964
Marathon County Center
Wausau

Presiding: Bob Johnson, Horace Mann Junior High School, Wausau.

Welcome: Mr. Jerome Onheiber, University of Wisconsin Extension Center, Wausau.

JON BENDRICK, Gr. 8, John Muir Junior High School, Wausau; Bending Wood to a Form.

JANE E. BOEHMER, Gr. 9, Horace Mann Junior High School, Wausau; Effects of Insulin on Minnows.

PATRICK D. CHROUSER, Gr. 9, John Muir Junior High School, Wausau; The Use of Phosphorus in the Animal Body.

DAN DEAN, Gr. 8, John Muir Junior High School, Wausau; Pi, Probability and You.

DOUGLAS DOEDE and TOM MASON, Gr. 8, John Muir Junior High School, Wausau; Effects of Radiation on Plant Life.

JOHN P. DZUBAY, Gr. 9, Horace Mann Junior High School, Wausau; What Causes Evergreens to Die During the Winter?

BECKY EIKELAND and BETSY HARPER, Gr. 9, Horace Mann Junior High School, Wausau; Effects of Detergents on Seed Germination, Plant Growth and Fish.

GAIL M. HOEPPNER, Gr. 7, Horace Mann Junior High School, Wausau; Attempts to Change Color of Cold Light.

DAVID A. HUSSONG, Gr. 9, Horace Mann Junior High School, Wausau; Effect of Electricity on Growth of Plants.

DON KLINGER, Gr. 9, John Muir Junior High School, Wausau; Solar Cells and How They Work.

BEVERLY KUNDO, Gr. 9, John Muir Junior High School, Wausau; Artifical Fertilization in Frogs.

CHRISTINE MEISENHEIMER, Gr. 8, Washington Junior High School, Tomahawk; Effect of Wind on Corn Plants.

CHRISTINE J. NEWMAN, Gr. 9, Horace Mann Junior High School, Wausau; Effect of Ultraviolet Radiation on Mutation Rate in Bacteria.

ROGER D. RANDL, Gr. 9, Horace Mann Junior High School, Wausau; Effects of Detergents on Living Plants.

STEPHEN SCHALLER, Gr. 8, John Muir Junior High School, Wausau; Studies of Meteoritic Dust.

JENNIFER L. SIMPSON, Gr. 9, Horace Mann Junior High School, Wausau; Chemical Warfare Between Plants.

RICHARD H. STAHMER, Gr. 9, Horace Mann Junior High School, Wausau; Development of a Fuel Cell.

MICHAEL C. WARNICK, Gr. 9, Horace Mann Junior High School, Wausau; Observing the Moon Through Filters.

NANCY S. WESTGATE, Gr. 9, Horace Mann Junior High School, Wausau; Effect of Insecticide on Mice.

PHOTO EFFECTS ON HUMAN SPERM
(contd. from p. 8)

In the third phase of this study the photo tube procedures were again used but this time the tubes were exposed to red light. The graphed results (Fig. 2) from these tests showed a 3:1 ratio between the sperm from the dark end and those from the light end of the tube, while the ratio of the significant segments five, six, seven and eight was 4:1. The fact that the 3:1 ratio from the red light tests is higher than those for white light and the fact that no readings were obtained for segments six, seven

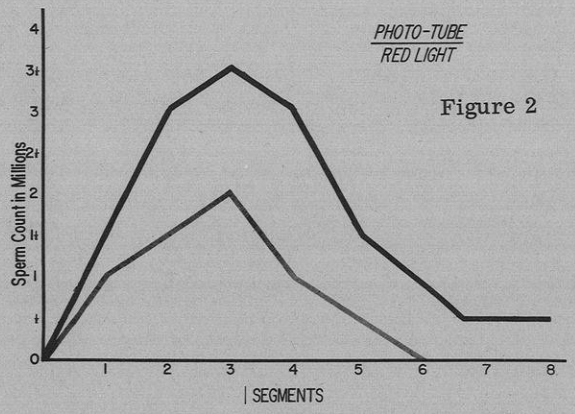


Figure 2

and eight with red light while white light tests showed only segments seven and eight with no count indicates that the sperm are more photosensitive to red than to white light. It is fair to say that red light affects spermatozoa in a different manner than white light, or in the same manner but more intensely.

Tests employing ultraviolet rays were also used in the photo tube tests. Sperm counts for each of the sixteen segments of the tubes were made and graphed as in the earlier tests (Fig. 3). Suprisingly

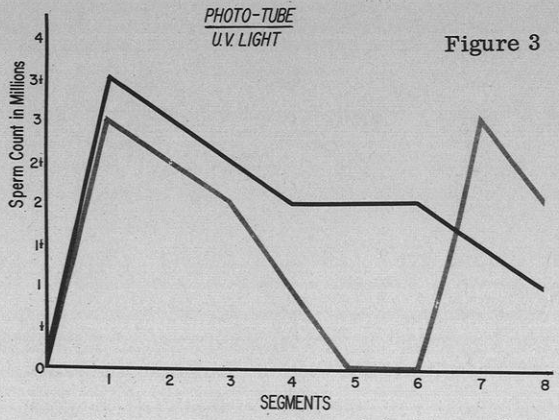


Figure 3

no sperm were observed at points five and six on the light end of the tube (Fig. 3). In the earlier white and red light tests points seven and eight on the light end of the tube also read zero, but with ultraviolet light for the same points seven and eight, the count showed five million sperm approaching the light with the rest of the sperm acting as expected, that is, shunning from the light. The ratio of the dark-end count to the light-end was 1.3 : 1 and the ratio of the significant segments five, six, seven and eight was 2.5 : 1. From the work done so far no satisfactory explanation can be offered for the unusual behavior of the above sperm migration toward the light. It was once proposed that X and Y sperm could be separated by light. Perhaps these findings could point such a possibility.

At the present time I am developing a procudure whereby tests can be run with photo tubes loaded with rabbit spermatozoa against ultraviolet light in hope of getting an isolated group of sperm which will seek the light.

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Deering, R. A., "Ultraviolet Radiation and Nucleic Acids," Scientific American, Dec. 1962.

Sherman, J. K., Fertility and Sterility, v. 14 (Improved Methods of Preservation of Human Spermatozoa by Freezing and Freeze-Drying), American Society for the Study of Sterility.

BIOLOGICAL CLOCKS
(contd. from p. 9)

The conclusions were so obvious (hypothesis supported) that I tried the same experiments over again for the same amount of time. The results were identical.

Figure 2 shows the last experiment: unpatterned day. This one is the most conclusive for an obvious reason, plus the fact that it was the one in which the mice were away from the environment for the longest time.

This project is only the start. If the photoperiod doesn't affect the "clocks," what does? This and other questions will be answered by the diligent and well-planned work of scientists in the next few years.

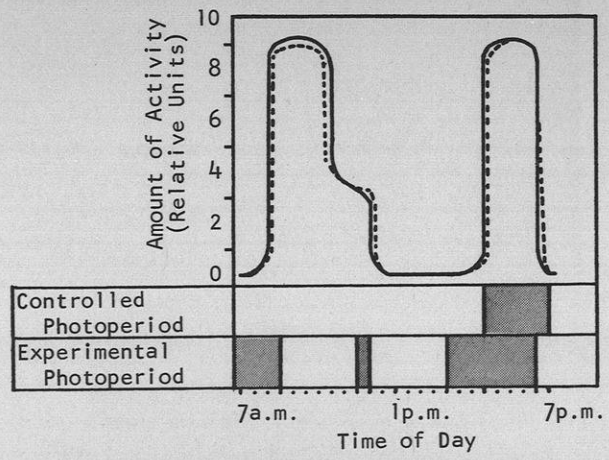

Figure 2. Unpatterened photoperiod and control results. (—— experimental mice; ----- control mice. ▬ dark; ▭ light.)

THIN-LAYER CHROMATOGRAPHY
(contd. from p. 11)

BIBLIOGRAPHY

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HIGH-ENERGY SPARKS
(contd. from p. 12)

creased resistance. However, with a positive plate electrode, the electrons flowing from the negative discharge-electrode find the water surface a poorer conductor since the water surface is positive and lacks necessary free electrons and negative ions. Possibly higher concentrations of solute decreased the distance between ions and increased the electrostatic attraction between them, thus decreasing their mobility. Higher concentrations thus partially negated the dielectric effect of water, which prevents the re-combination of ions in solution. The solution was kept homogeneous, enabling the discharge to be more readily conducted through the liquid than on its surface.

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RESPONSE OF PLANARIA
(contd. from p. 20)

RESULTS

The results of these studies indicate:

1. That there is a transfer of instrumental learning in planaria by regeneration and ingestion.

2. That both the head and the tail portion of the planaria are capable of memory storage. The chemical substance that stores the imprint of the training and is transferred from one worm to another through ingestion and regeneration has not yet been found.

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NORTH CENTRAL DISTRICT
(contd. from p. 28)

DISTRICT COMMITTEE

District committee membership included: Oliver A. Andrews, WSU-Stevens Point (chairman of local arrangements, 1963-64); Alfred L. Hornigold, Lincoln High School, Wisconsin Rapids; Bruce Karnath, Mosinee High School; Sister M. Lauretta, Columbus High School, Marshfield; Galen Parkinson, Mosinee High School; G. J. Romoren, Webb High School, Reedsburg; and Amos H. Yonke, Horace Mann Junior High School, Wausau.

Mr. Thomas Hayes, Science Supervisor, Campus Laboratory School, WSU-Stevens Point, has consented to act as chairman for local arrangements as Mr. Oliver A. Andrews is to be on leave.

NORTHEAST DISTRICT
(contd. from p. 29)

DONALD A. OLSON, Sophomore, Appleton Senior High School; Gene Pools in Appleton.

PATRICIA E. PLAMANN, Sophomore, Xavier High School, Appleton; Growth in Isolated Leaf Segments.

JOEL P. REDFIELD, Sophomore, Lourdes High School, Oshkosh; Amino Acid Differences of Protein Classifications in Certain Related Species.

ERIC C. ROEHL, Senior, Appleton Senior High School; Plasma, the Fourth State of Matter.

BILL S. SCHUSTER, Sophomore, Lourdes High School, Oshkosh; The Effects of Reproductive Hormones on Secondary Sex Characteristics.

CLAUDIA T. SHAPIRO, Junior, Lincoln High School, Manitowoc; What Effects Will Radiation and Irradiation Have on the Metabolic Activity of Saccharomyces cerevisiae?

MARILYN A. STADLER, Sophomore, Xavier High School, Appleton; Growth Regulator Activity.

SARAH A. STILP, Sophomore, Xavier High School, Appleton; The Modern Bean Tranquilized.

GEORGE SYLVESTER, Kimberly Senior High School; Water of Hydration.

EDWARD A. VAN RAVENSTEIN, Sophomore, Lourdes High School, Oshkosh; The Regeneration of Worms as Affected by Chemicals.

PATRICK A. VOGEL, Sophomore, Lourdes High School, Oshkosh; Experiments on Cancer Tissues Found in Plants.

JAMES L. WARGULA, Sophomore, Lourdes High School, Oshkosh; The Continuous Wave Transmitter.

TOM WENTZEL, Kimberly Senior High School; Growth Rates of Crystals.

LINDA WHITE, Fox Valley Lutheran High School; Spots Before Your Eyes.

NORTHWEST DISTRICT
(contd. from p. 30)

EILEEN LAGAE, Sophomore, Cathedral High School, Superior; Reactions of Coca-Cola and Other Soft Drinks.

MARILYN A. LANGER, Sophomore, Regis High School, Eau Claire; Response of Planaria to Instrumental Learning.

MARY B. LENROOT, Senior, Cathedral High School, Superior; The Analysis of Articles from Scientific American.

FRANCES LEVINGS, Sophomore, Cathedral High School, Superior; The Disinfectant Properties of Soaps and Detergents.

THOMAS R. ROSS, Senior, Central High School, Superior; The Effects of Amphetamine Sulfate on Basal Metabolism.

ELRIC W. SAASKI, Senior, South Shore High School, Port Wing; Theoretical and Practical Uses of High-Energy Sparks.

J. NICHOLAS SCHWEITZER, Junior, Central High School, Superior; A Refutation of the Proof of Cantor's Theorem.

RUSSELL M. SPRY, Senior, McDonell High School, Chippewa Falls; From Sun to Sound.

BRIAN W. VAN HOVE, Sophomore, Cathedral High School, Superior; Studies of Drosophila.

SOUTHEAST DISTRICT
(contd. from p. 31)

DENNIS A. KING, Junior, Custer High School, Milwaukee: Lithium: Reactions and Relations With Other Alkalies.

ERICH MARQUARDT, Senior, Waukesha High School; Radiocarbon Dating.

JOHN D. HORVATH, Junior, Milwaukee Lutheran High School, Milwaukee; Rocket Fuels.

BEVERLY A. POKEL, Junior, Milwaukee Lutheran High School; Thyroid Hormone - A New Plant Auxin?

ROBERT W. SCHRAML, Senior, Milwaukee Luther- and High School; Conductometic Titrations.

RICHARD W. STRAUSS, Junior, Custer High School, Milwaukee; The Preparation of Cadmium Sulfide and Application in Photocells.

Mathematics Section

ROBERT J. ASCOTT, Senior, Washington High School, Milwaukee; Components of Computers.

GERALD W. BAUMANN, Senior, Custer High School, Milwaukee; That Terrible Torus.

LEON H. CAHILL, Junior, Custer High School, Milwaukee; Finite Geometries.

Physics Section

BARRY D. AUGUSTIN, Senior, Washington High School, Milwaukee; Macro-Molecular Particle Acceleration.

DON F. DUSTIN, Senior, Nicolet High School, Milwaukee; The Relationship Between the Thermologic Conductivity of a Metal and Its Density, Temperature, and Electroconductivity.

JOHN R. HILL, Senior, Rufus King High School, Milwaukee; Ultrasonics.

ERIC M. JACOBSON, Senior, Nicolet High School, Milwaukee; A Study of the Hilsch Vortex Tube.

PAUL H. KLINK, Senior, Beaver Dam Senior High School; The Theoretical Design and Construction of Amateur Rocket Systems.

DENNIS L. MATTHIES, Senior, Wauwatosa West High School; Metastable State Maser Theory.

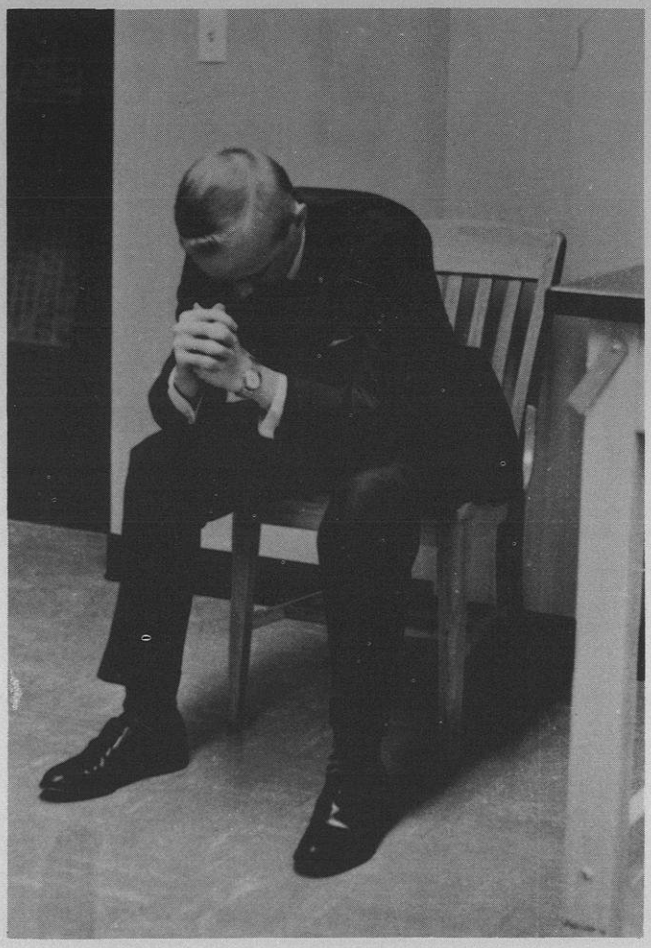
RICHARD S. MIKO, Junior, Milwaukee Lutheran High School; Circuit Cooling.

THOMAS D. POPPENDIECH, Senior, Nicolet High School, Milwaukee; The Rise of Bubbles.

JAMES L. SERNOVITZ, Senior, Nicolet High School, Milwaukee; Analysis of Non-Repetitive Motions Through the Use of Stroboscopic Photography.

PETER L. SMITKA, Senior, Bay View High School, Milwaukee; The Construction and Use of a Spark Spectrograph.

GILE E. TOJEK, Senior, Bay View High School, Milwaukee; A Mass Field Spectrometer.



--- CITATION ---

In tribute to the physical science and mathematics teachers of Wisconsin High Schools for developing an interest in science and mathematics in their students, and

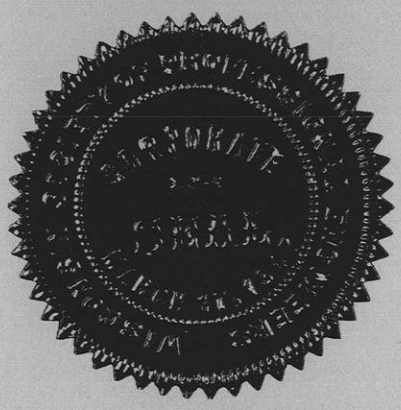
In sincere appreciation for their encouragement of qualified students to continue their education toward professional degrees in science and engineering, and

In recognition of the vital importance of this work in developing scientists and engineers needed to keep America great

The Wisconsin Society of Professional Engineers present this day to . . .

Wisconsin Junior Academy of Science

for its part in nurturing and furthering excellence in the above-stated activities of the science and mathematics teachers of Wisconsin this citation



T. J. Higgins
Chairman of Education Committee

W. S. Cottingham
President, Wisconsin Society of Professional Engineers

WISCONSIN JUNIOR ACADEMY OF SCIENCE
Extension Division
The University of Wisconsin
432 North Lake Street
Madison, Wisconsin 53706

Science Clubs Chartered by the WJAS 1963-64

The following science clubs were chartered by the Junior Academy during the 1963-64 academic year. This is a continuation of the listings which appeared in the 1961-62 and 1962-63 Annual Reviews.

ASHLAND

Ashland High School, Science Club, September 16, 1963. Sponsors: Messrs. Richard W. Mihalek and Thomas Gerstenberger.

BIRNAMWOOD

Birnamwood High School, Science Club, December 4, 1963. Sponsor: Mr. Onan Eide.

GREEN BAY

Franklin Junior High School, Science Club, March 26, 1962. Sponsor: Mr. C. Cole.

PRAIRIE DU CHIEN

Prairie du Chien High School, Cosmic Rays, November 27, 1963. Sponsor: Mr. Donald E. Kasparek.

SUPERIOR

Central High School, JETS Chapter 259, November 12, 1963. Sponsor: Mr. Robert Silvernale.

VIOLA

Viola High School, Science Club, March 18, 1964.

WATERTOWN

Watertown High School, Science Club, January 21, 1964. Sponsor: Mr. Carlos Alvarez.

WAUSAU

John Muir Junior High School, Science Club, April 3, 1964. Sponsor: Miss Linda Malick.

1963-64 ASSOCIATE MEMBERS

Peter Croy . . . . . Manitowoc

Bruce Harstad . . . . . Prairie Farm

Neil Sanders . . . . . La Crosse

Billy Tilson . . . . . La Crosse

Academy News

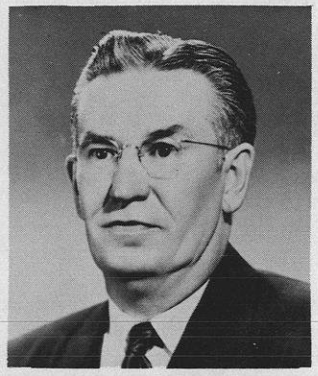
Academy Officers for 1964-65

WALTER E. SCOTT, President, has been Administrative Assistant to the Director of the Wisconsin Conservation Department since 1950. He has been associated with that Department for the past 30 years as Conservation Warden (1934-36), Game Management Supervisor (1936-43 and 1946-48), and Editor, Information and Education Division (1948-50). He was born in Milwaukee in 1911, attended the public schools there and was a Leader and Nature Instructor at the Milwaukee BSA Camp (1925-34). He attended Kalamazoo (Michigan) College (B. A., 1933; M. A., 1955) and the UW at Madison (a second M.A. pending thesis completion). During WW II he spent two and one-half years in the South Pacific and Japan in Counter Intelligence work.

Mr. Scott has been active in the affairs of the Academy. He became an Active Member in 1941 and a Life Member in 1963. His Academy activities include membership on various committees; founder, editor (1954-63) and consulting editor of the Wisconsin Academy Review; librarian; chairman of the Centenniel Committee; and program chairman of the 94th Annual Meeting ("Natural Resources of Northern Wisconsin").

Among his affiliations, Mr. Scott lists the following: Britain's Wildfowl Trust (life member), Wildlife Society, American Forestry Association, Izaak Walton League, Soil Conservation Society of America (currently chairman, Archives Committee), Sierra Club, National Audubon Society, Wisconsin Society for Ornithology (co-founder, past-president, founding editor of The Passenger Pigeon, 1939-43, and currently custodian), Wilson Ornithological Society, American Ornithologists' Union, Wildlife Federation, Conservation Education Association, Wilderness Society, American Nature Study Society, Nature Conservancy, Wisconsin Phenological Society, Friends of the Arboretum, Ridges Sanctuary, Citizens Natural Resources Association (co-founder and recently presented with the Silver Acorn Award for conservation services), Wetlands for Wildlife, Friends of Our Native Landscape, Wisconsin Roadside Council for Resource Development and Conservation, American Society for Public Administration (Wisconsin Chapter past-president), American Association for the Advancement of Science, Wisconsin Archeological Society, State Historical Society and Society of Tympanuchus Cupido Pinnatus.

President Scott has authored many articles appearing in the Journal of Wildlife Management, The Auk, Wisconsin Conservation Bulletin, Badger History, The Passenger Pigeon, and has published a book of poetry, Poems to Trudi (1950). His hobbies include writing and editing, bird study, gardening and planting exotic and native trees and shrubs, and discovering and recording tree records. His personal library of wildlife and conservation history is probably one of the finest to be found anywhere.

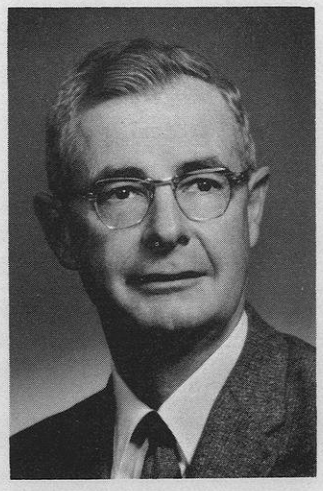


HARRY H. CLARK, President-Elect, received his B. A. degree from Trinity College (Hartford, Conn.) in 1923 and while earning an M.A. at Harvard University won the Bowdoin Prize in English. He taught at Yale University while doing graduate work there, then went to Middlebury College, Vermont, as assistant professor, 1925-28. In 1928 Professor Clark moved to the University of Wisconsin, became an associate professor in 1932, and four years later was made full professor.

Along with advanced courses in American Literature, he has taught introductory survey courses for over 30 years. He has served as a member of the administrative committee of the UW Graduate School and was on the committee which founded the UW Press. He has done extensive editorial work on books concerning American authors and for the Modern Language Assn. and affiliates. He was general editor of the 24-volume "American Writers Series" and has published in numerous national scholarly periodicals, including six studies on the influence of science on American authors in the Academy's TRANSACTIONS.

Professor Clark, at various times, has served as chairman of the Division of American Literature and the Division of Science and Society of the Modern Language Association. He has directed more than eighty doctoral dissertations, one of which was awarded a Pulitzer Prize. In 1953-54 he was Visiting Professor at the University of Uppsala, Sweden, and has had several research fellowships. He holds honorary degrees from Bowling Green State University and from Trinity College. Professor Clark has been affiliated with the Academy since 1930. (Reprinted from the Wis. Acad. Rev., V. 10, No. 3, pp. 135-6.)

Officers

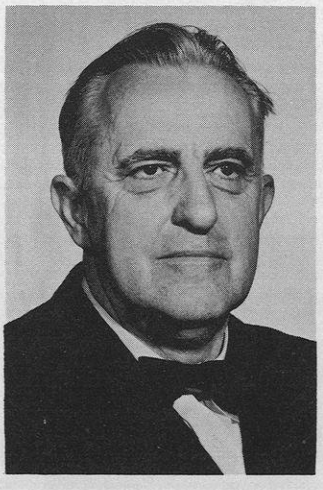


JOHN W. THOMSON, Vice-President (Sciences), was born in Scotland on the south side of the Firth of Forth in 1913. Following a two year stay in France he emigrated to the United States in 1922. Here the family lived in Florida and then in New York. After attending Columbia College on a Pulitzer scholarship (A.B., Columbia, 1935), he came to Wisconsin for graduate studies with Norman C. Fassett in the Botany Department at the University of Wisconsin (M.A., 1937, Ph.D., 1939), studying the ecology of prairie plants in central Wisconsin for his dessertation. A two year period of service as Director of Staff of School Nature League at the American Museum of Natural History in New York was followed by a semester of teaching at Brooklyn College, then return to Wisconsin to teach at Superior State College during 1941-1944. During the stay in Superior he did research on the Brule River Survey, producing three papers which were published in the TRANSACTIONS in the series on the Brule River, one of them in collaboration with State Geologist E. F. Bean.

During 1944 he returned to the University of Wisconsin as Assistant Professor in the Botany Department, with part time released to found the Wisconsin Junior Academy of Science, a program with which he was active until 1960 when the press of other duties intervened. Since 1947 he has been Chairman of the Department of Botany and Zoology in Extension, helping in the growth of the Center system of the University. Since 1962 he has been Professor of Botany at Madison.

Long interested in the lichens in his research program, Professor Thomson has been concentrating on Arctic lichens during the past several years, working on a manual for the identification of the species of the far north. During this work he has made nine trips into the tundras, ranging from Labrador to western Alaska, to the north in the Arctic islands and to Lapland in Scandinavia. Through his activities and those of his students, the lichen collection in the herbarium of the University has become one of the finest in North America, containing over 30,000 specimens, with the northern material being especially well represented. He has served as Vice-President and President of the American Bryological Society and as Recording Secretary of the Torrey Botanical Club. In 1960 he was elected Life Member of the Wisconsin Academy of Sciences, Arts and Letters in recognition of his work with the Junior Academy.

The publications of Professor Thomson include many articles of "popular" type as well as 40 papers of technical nature and two large monographs dealing with particular genera of North American lichens. One of these was recently published in Germany. Another large study of book size on the Cladonias of North America is ready for publication.



WILLIAM M. LAMERS, Vice-President (Arts), was born in Milwaukee on December 23, 1900. He received all his academic training (A.B., A.M. and Ph.D.) at Marquette University. He was Director of Marquette University's School of Speech (1929-1941) and has been Assistant Superintendent of Milwaukee Public Schools since 1941.

His election as president of many of the organizations with which he is affiliated demonstrates the leadership qualities which he possesses. Among these organizations are: Wisconsin Association of Teachers of Speech, Serra Club of Milwaukee, Milwaukee Municipal Art Commission, Wisconsin and National Education Associations, Catholic Theatre Guild, and the State Historical Society of Wisconsin. He has held editorial positions on the American School Board Journal and the Wisconsin Poetry Magazine; and is currently on the editorial board of the Music Educators Journal.

Dr. Lamers is also currently president of the Board of Trustees of the Milwaukee Public Museum and vice-president of the Board of Trustees of the Milwaukee Public Library.

He is a prolific writer, being credited with 10 books, 8 booklets, 17 plays, considerable verse, and approximately 250 articles. Among honors to his credit are: the Wisconsin Poetry Society Award, Annual Book Award of the State Historical Society of Wisconsin, honorary state membership in the National Forensic League and runner-up for the Fletcher Pratt Award (1962) for the best Civil War book of the year. He has been associated with the Academy since 1939.

WALKER D. WYMAN, Vice-President (Letters), became the ninth president of Wisconsin State University-Whitewater on July 1, 1962. Until his election to the post at Wisconsin's second oldest state university, he was chairman of the department of social science at WSU-River Falls. A nationally recognized authority on frontier history, he had taught there since 1932. At various times he had been visiting professor of history at the Universities of Wisconsin, Minnesota and Maine.

He received his Bachelor of Education degree from Illinois State Normal University in 1929 and both the M.A. (1931) and Ph.D. (1933) in history from the State University of Iowa. A prolific writer, he is the author of several books, some 25 articles, and more than 200 book reviews in scholarly journals. He was one of the editors of The Frontier in Perspective published by the University of Wisconsin Press in 1957 (See Wis. Acad. Rev., V. 6, No. 1, p. 38). He is a member of the American Historical Association's Committee for the Teaching of History in the Schools and serves on the board of the Association's Service Center for Teachers. Currently he is chairman of the Wisconsin State Universities Centennial Committee and is active in the State Historical Society and other historical and educational bodies. Some years ago he was selected one of the "three most distinguished alumni of Illinois State Normal University." (Reprinted from the Wis. Acad. Rev., V. 9, No. 3, p. 121.)

S. JANICE KEE, Librarian, was born in Texas and received her academic training at Texas Wesleyan College (B. S., 1935) and Texas State College for Women (M.L.S., 1951). She began her career as a class room teacher and school librarian (1927-35) and was a high school librarian (1935-41). Miss Kee served as a librarian at various places (County Librarian, Beaumont, Tex., 1941-43; Army Library Supervisor, 1943-47; Extension Librarian and Acting State Librarian, Jefferson City, Mo., 1947-50) before coming to Wisconsin as Instructor of Library Science in 1950. During the period 1952-56, Miss Kee served as Executive Secretary of the Public Libraries Division of the American Library Association where she had the opportunity to study and visit public and state library systems in all states and in Europe. She has been Secretary of the Wisconsin Free Library Commission since 1956.

Miss Kee is active in a variety of organizations. Among these are: American Association of University Women; Wisconsin Library Association (past-editor, Wis. Lib. Bull. and currently a member of the Exec. Bd.); American Library Association (past-president of the American Association of State Libraries and currently on the Committee on Program Evaluation and Budget); American Country Life Association; Wisconsin Arts Foundation and Council, Inc. (member, Exec. Bd.); Council for Wisconsin Writers (member, Advisory Comm.); and Friends of Wisconsin Libraries (professional adviser).

She has also held appointments to many State posts: Interdepartmental Committee on Aging Population (currently chairman); Governor's Conference on Aging (secretary, 1959-60); Governor's designee to the White House Conference on Aging - 1961. Miss Kee has been a member of the Academy since 1956.

SBPSA

R. M. DARNELL, JR. (A 56), associate professor of zoology at Marquette University has been appointed to a second two-year term on the State Board for the Preservation of Scientific Areas. Dr. Darnell has been appointed on the recommendation of the Wisconsin Academy to represent the private colleges of the State. He was recently elected Chairman of the Board.

Other members of the Board include: EDWARD SCHNEBERGER (A 42), secretary and executive officer, representing the Wisconsin Conservation Department; ORIE L. LOUCKS (A 64), representing the UW at Madison; Henry W. Kolka, Eau Claire, representing the State Universities; EMIL P. KRUSCHKE (A 40), representing the Milwaukee Public Museum; and Frank N. Brown, representing the Department of Public Instruction.

Who's Who

Seven Academy members have been included in the 33rd biennial edition of Who's Who in America for the first time. Included in the list are: ROBERT J. DICKE (A 47), professor and chairman, Department of Entomology, UW at Madison; PERCY L. DUNN (A 54), emeritus president, Milton College; WALTER A. FRAUTSCHI (A 42, L 48), president, Democrat Printing Co., Madison; EUGENE H. KORTH, S.J. (A 60), associate professor of history, Marquette University, Milwaukee; RICHARD W. E. PERRIN (A 63), architect and urban renewal officer, Milwaukee; EDWARD SCHNEBERGER (A 42), fish management official, WCD, Madison; and WALKER D. WYMAN (A 63), president, WSU-Whitewater.

TRANS. Abstr.

The TRANSACTIONS of the Wisconsin Academy is now listed among the world's biological publications abstracted by Biological Abstracts. Biological Abstracts is a comprehensive abstracting and indexing journal of the research literature in theoretical and applied biology and has been published since 1926. It is indexed in Chemical Abstracts.

Gifts

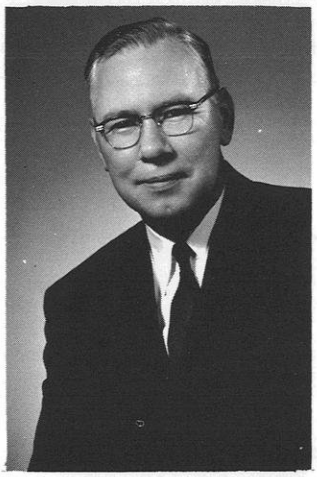
Several gifts have been received by the Academy during 1964. Among these are: $5.00 from OTTO L. KOWALKE (L 19), Madison; $20.00 from LOWELL E. NOLAND (A 22, L 47), Madison; $5.00 from HARLAND W. MOSSMAN (A 24, L 64), Madison; $15.00 from WALTER C. YAEGER (S 61), Wauwatosa; $100.00 from RALPH N. BUCKSTAFF (A 22, P 55, S 59, L 62), Oshkosh; three bonds totaling over $2,800.00 from HARRY STEENBOCK (A 21, L 61, P 63), Madison (for publication of a special part of the TRANSACTIONS to be entitled "The Natural Resources of Northern Wisconsin"); and $100.00 from the Kimberly-Clark Foundation, Neenah (to support the Junior Academy Awards programs).

New Life Members

HAZEL S. ALBERSON, favorite teacher of comparative literature to generations of University of Wisconsin students, celebrated her retirement to emeritus status in June by becoming a Life member of the Wisconsin Academy. Her "new career" began immediately as she directed summer seminars for alumni and lectured over the radio and at UW Centers throughout the state. A seminar on Cultural Change and Interchange, East and West" proved popular this past summer and a series on literary classics of the ancient world is planned for the Green Bay Center in the fall as well as others based on requests received.

Born in Washington, Iowa, Hazel Stewart earned a B. A. degree at Monmouth College in 1917. Before World War I she married Oral Alberson but by 1927 fatal illness had taken both her husband and baby daughter. She returned to teaching as instructor of Latin and French in Buncombe County schools of North Carolina and earned the M.A. degree at Duke University in 1931. Shortly thereafter she began her work at the UW with the late Philo Buck. Earning the Ph.D. degree in 1935, she was named associate professor in 1947 and served as department chairman for two periods. Monmouth College awarded her an honorary Lit. D. in 1943 and she represented Wisconsin at the Tagore Festival in India in 1961.

With Prof. Buck, Mrs. Alberson edited "An Anthology of World Literature" and "A Treasury of the Theatre." She wrote numerous articles for scholarly journals. Her professional organizations include the Medieval Academy and Phi Delta Gamma. Thousands of appreciative letters have marked her "Great Books" and "Visions That are Timeless" programs over Station WHA, which prizes her "scholarly yet popular" method of presenting her material. ---Gertrude M. Scott



GORDON A. BUBOLZ, new Life member of the Academy, was born in Seymour, Wisconsin in 1905. He graduated from Lawrence College, the Wharton School of Commerce and Finance of the University of Pennsylvania, where he majored in insurance and received a Certificate of Distinction, and the University of Wisconsin Law School from which he graduated in 1940. He has long been active in civic affairs and represented Shawano and Outagamie counties in the State Senate for nine years. He served as Chairman of the Senate Committee on Labor and Management and became the first Secretary of the Legislative Council which was created by the 1947 session.

His conservation interests are well known and he was a founder and General Chairman of the High Cliff Forest Park Association which spearheaded the drive for a state park at that location. Representing the City of Appleton on the Fox Valley Regional Planning Executive Commission, he is Chairman of its Land Use and Zoning Committee. He was a Co-Founder of the Wolf River Improvement Association leading to the establishment of the Wolf River Basin Regional Planning Commission, which he now serves as Chairman. Also, he is Chairman of the Advisory Committee to the Department of Resource Development.

When the movement for a Fox Valley Center of the University of Wisconsin began, he led the committee which secured joint sponsorship of Outagamie and Winnebago counties and was President of the Fox Cities Foundation which raised $45,000 to enable it to donate the 20 acre site. His work with the Appleton Chamber of Commerce includes memberhsip on several committees and he is a past president. He is a member of an Appleton law firm and of the Outagamie County and State Bar Associations, and heads the Home Mutual Insurance Companies of Appleton. ---Gertrude M. Scott

Retirements

THOMAS C. ALLEN retired from the University of Wisconsin entomology department last April after 35 years of service. Before coming to Wisconsin as a research assistant in 1929 he had received B.S. and M.S. degrees in entomology and zoology from Oregon State College. He obtained his Ph.D. degree in 1932 and became an instructor specializing in truck crop insects. Five years later he became assistant professor, advancing to full professor by 1945 and becoming department chairman the next year. It was at that time that he joined the Wisconsin Academy. During his 13 year term the department was enlarged considerably and research broadened to include forest insects, toxicology, morphology and physiology. Professor Allen is best known nationally for his research on sabadilla, an insecticide, and for devising mechanical and rotational control measures before good insecticides were available for truck crop vegetables. At the conclusion of his chairmanship in 1959 he began to study termites and developed an attractant which has possibilities as a "bait." He plans to study Pacific Coast termite species at his small fruit ranch in Oregon, as well as keep up his interests in fruit insects.

---Gertrude M. Scott

RALPH A. McCANSE, poet, writer, scholar, and teacher, who for 38 years has served on the English faculty of the University of Wisconsin, the last 33 of them in the Extension Division, retired July 1, 1964. He has been an Academy member since 1954 and associate editor (letters) of the Review since that time.

This native of the "hills and hollers" of Missouri was born in Mt. Vernon in the central part of the state and has helped preserve part of the local color and history of the area in two book-length narrative poems, "The Road to Hollister" and "Waters Over Linn Creek Town."

This sensitivity to the little-things-that-matter has made him a highly successful teacher-by-correspondence, the role in which hundreds of students remember him best.

"He makes students keenly aware of his regard for them as individuals," a colleague recently said, "and establishes a personal relationship far better than many teachers who have face-to-face contact with their students."

Prof. McCanse has been in charge of the freshman English correspondence instruction program at Wisconsin, taught 19th century literature, and has taken particular delight in three special courses which he developed to serve specific needs--specialized exposition, versification, and literary criticism, the last leading to his latest publication, "The Art of the Book Review."

A recognized authority on Rose O'Neill, famous Ozark artist who created the Kewpie, he currently is working on a book concerning the artist.

His family includes his wife, the former Jessie Hill; a daughter, Mrs. Elizabeth Laible of San Francisco and a son Ross, a television specialist with a New York advertising agency. A three-year-old granddaughter, Margaret, is the only member of the McCanse family not a Phi Beta Kappa. ---Jeane Young

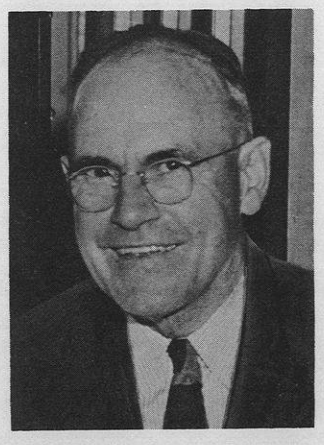
ALBERT J. RIKER retired in July from the University of Wisconsin's staff after 44 years of biological research. Born in Wheeling, W., Va., he finished high school in Moundsville, and before attending college worked for the Royal Three Barrell Gun Co., and as an auto repairman and salesman. In 1917 he received an A.B. degree in botany at Oberlin College, then taught at the University of Cincinnati until going overseas as a bacteriologist during World War I. Following that he obtained an A.M. degree in botany and bacteriology at the University of Cincinnati. In 1922 he earned a Ph.D. degree at the University of Wisconsin with research on the crown gall plant tumor disease. He has worked at the University ever since except for a year of study in London and Paris in 1926-27.

Prof. Riker's broad interests have encompassed many phases of plant pathology and he is a leader in the fight against plant diseases as well as an important contributor in basic and applied research. In 1955 Riker announced a discovery that trees often are connected by root grafts thus setting up direct "pipelines" for spread of diseases such as oak wilt and Dutch elm disease. He pioneered new approaches to control white pine blister rust by making feasible eventual production of disease-resistant stock. As a specialist in tree diseases, he visited 18 countries in Europe, Asia and the South Pacific in 1959 trying to find means of slowing down or preventing international spread of tree diseases. His career as a teacher and scholar is equally impressive and his students now are leaders in science throughout the world. He initiated discussions leading to formation of the Biotron Committee and plans are now complete and funds available for this controlled environment facility at Wisconsin. He will continue to do research at the UW's new H. L. Russell Laboratories. A distinguished member of many scientific societies, he was Chairman of the Section of Botany, National Academy of Sciences, 1959-62, and is a Fellow of the AAAS and American Academy of Microbiology. Prof. Riker joined the Wisconsin Academy in 1957. He has been vice-president and president of the American Phytopathological Society and helped develop the profession. Several learned societies have honored him with medals and awards. ---Gertrude M. Scott

Introducing

KARL W. MEYER was appointed president of Wisconsin State College (now University) at Superior last March. He had been assistant director of the state college system. A native of Fort Wayne, Indiana, he served overseas with an army airways communications system unit after graduation from high school. In 1948 he obtained a B.A. degree at Valparaiso University and spent the next year at the University of Basel, Switzerland, earning a Master's degree in history from the University of Maryland. Later he attended the University of Wisconsin and received the Ph.D. degree in history in 1952. After a year of teaching at Valparaiso University, he joined the history department at Augustana College in Sioux Falls, S.D. Returning to Wisconsin in 1955 he taught history at the State College at Eau Claire for three years. During the 1958-59 school year, he was one of five men selected in a nationwide program to make up the first group of Carnegie Fellows in College Administration at The University of Michigan Center for Study of Higher Education. He then became dean of instruction and director of graduate studies at Wayne State College in Nebraska until 1963. ---Gertrude M. Scott

In Memorium



LEWIS F. NELSON was born in Freeport, Ill. on November 22, 1880 and moved to Kaukauna, Wisconsin with his family while still a child. As a young man he worked for the North Western Railway Company in various jobs and in 1911 he became a teller for the newly established Farmers and Merchants Bank. By the early 1920's he was a director and he served as president from 1933 until his retirement in 1955. The Badger Tissue Mills invited him to become general manager in 1917 and he headed that business until it was sold in 1955. Mr. Nelson died at Ft. Lauderdale, Flordia, where he had a winter home, on November 11, 1963.

Civic activities claimed much of his attention and he was mayor of Kaukauna from 1937-40 and 1942-46. He served on the school board there and was responsible for many city beautification projects. He was an active Democrat and was on the Governor's Commission on Human Rights for several years. Ardent conversationist and historian, he was a curator of the State Historical Society and member of the Outagamie and Door County Historical Societies, the Ridges Sanctuary, Friends of Our Native Landscape, and Wisconsin Society for Ornithology. He joined the Wisconsin Academy in 1953. He "fathered" the formation of High Cliff State Park and was first president of the Park Association. His interest in trees resulted in preservation of a cottonwood tree on the eastern shore of Lake Winnebago, claimed to be the state's oldest tree.

---Gertrude M. Scott

THOMAS E. COLEMAN, an Academy member since 1942, was born in Aurora, Ill. February 23, 1893 and died in Madison on February 4, 1964. His family moved to Madison in 1895 and he graduated from Central High School there. When the family went to Chicago shortly afterward, he attended the University of Chicago and obtained a B.A. degree. During the summers he worked at the Madison-Kipp Corp., of which his father was president, and after graduation he was a coast-to-coast salesman for the company. In 1918 he became vice-president and general manager, and succeeded his father to the presidency of the manufacturing firm in 1927. He was a founder of the Security State Bank of Madison.

Mr. Coleman's active career in politics began in 1928 when he volunteered to work in the campaign of Walter Kohler, Sr. For more than 30 years he exerted a strong influence on the Republican party in Wisconsin though he never sought public office. He was state chairman of the party for two terms and served on the finance committee for many years. He assisted in formation of the Republican voluntary organization and acted as its treasurer. He was also a leader in the movement to have the party endorse candidates for office. His most effective weapon in presenting his views was logic and he used it almost exclusively. Known as a man of "political precision" with a knack of analysis of political future, he was selected in 1950 as one of 24 national leaders working toward election of more Republican congressmen. He retired from active politics in 1956 but continued to counsel candidates and workers in the party. His high principles and integrity were well known among his countless friends. An avid dry fly fisherman, he made frequent trips to northern fishing areas but often spoke of the fine fishing near his home on the shores of Lake Mendota. He was a long-time friend of Aldo Leopold, following many of Leopold's conservation ideals.

---Gertrude M. Scott

Correction

On page 1 of the Winter-Spring issue of the Review, the Academy editors were misidentified. To rectify this error, the picture and CORRECTED caption are reproduced below.

TRANSACTIONS Editor Goodwin F. Berquist (l.) and Review Editor Jack R. Arndt at the 94th Annual Meeting (Photo by S. F. Darling)

Committee Appointments for 1964-5

The president of the Academy is an ex-officio member of all standing committees.

95th ANNUAL MEETING PROGRAM
Harry H. Clark, General Chairman
Jack R. Arndt
Goodwin F. Berquist
Robert J. Dicke
William Lamers
Eugene M. Roark
William Sieker
John W. Thomson, Jr.
Walker D. Wyman
Local Arrangements will be handled by Co-Chairmen Dicke and Sieker with a local committee to be announced later.

AUDIT
Frank H. Nelson, Chairman
Stanley Polacheck

BUDGET
David J. Behling, Chairman
Jack R. Arndt
Harry H. Clark
Stephen F. Darling
Aaron J. Ihde

LONG RANGE FINANCIAL PLANNING
Stephen F. Darling, Chairman
David J. Behling
Karl A. Bostrom
Ralph Buckstaff
Gordon A. Bubolz
Carl Steiger
Walter C. Yaeger

LONG RANGE PROGRAM PLANNING
Katherine G. Nelson, Chairman
Jack R. Arndt
Joseph G. Baier
George C. Becker
Roy D. Christoph
Harry H. Clark
Charles D. Goff
Ted J. McLaughlin
Walter F. Peterson

MEMBERSHIP
Joseph J. Chopp, Chairman
Roger Axford
Harry H. Clark
Charles D. Goff
Eugene Musolf
Eugene M. Roark

PUBLICITY
Douglas D. Sorensen, Chairman
Dion Henderson
Richard Hemp
Loren H. Osman
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State News

ACS

HENRY J. PEPPLER (A 48) (Universal Foods Corp., Milwaukee) was elected as a councilor for 1964-65. He was editor of The Amalgamator (1953-56), secretary (1955) and chairman (1960-61).

HAMILTON A. PINKALLA (A 57) (American Bio-Synthetics Corp., Milwaukee) was named as the recipient of the 1964 Milwaukee Section Award of the ACS for "outstanding service to industry, chemistry and the Section."

Carthage

The 94 year old campus of Carthage College (Carthage, Ill.) discontinued operations this past summer. All activities of the College are now headquartered at the Kenosha campus. (See Review, V. 7, pp. 151-2.)

CCHE

Authorization to establish six new study programs at four institutions of higher learning in Wisconsin was granted by the Coordinating Committee for Higher Education at their meeting on April 24. This action includes the granting of a master's degree in psychometry (the measurement of the speed and precision of mental processes) and an undergraduate major in sociology at WSU-Superior; a master's and doctor of philosophy degrees in African languages and literature at the UW at Madison; a master's degree in philosophy at UWM; and an undergraduate major in psychology at WSU-Stevens Point.

The Committee approved the establishment of four-year institutions of higher education in the Fox Valley area by 1969 and in the Racine-Kenosha area in the 1971 biennium at their meeting on June 12. Also approved was the establishment of new two-year University Centers in Rock and Waukesha counties and a State University branch at Rice Lake in the 1965-67 biennium.

Lawrence

The creation of Lawrence University resulting from the merger of Lawrence College founded in 1847 and Milwaukee-Downer College founded in 1851 occurred July 1. Academy members who moved to Appleton include Profs. ENID L. BEVER (A 55) (chemistry), ANNE B. LAY (A 50, S 62) (biology) and RONALD W. TANK (A 63) (geology).

In addition to students and faculty, Lawrence was enhanced by: a $13 million trust fund to strengthen faculty, improve programs and grant scholarships; a substantially improved library, combining the strengths of both colleges' holdings which are not extensively duplicated; and three new programs - home economics, occupational therapy, and elementary education which will be dropped when the present enrollees graduate.

St. Norbert

Rev. ANSELM M. KEEFE (A 27), chairman of the Biology Department at St. Norbert College, was recognized last spring by Phi Sigma, national biological science honor society, for "many years of devotion to the society." He was editor of the society's publication, The Biologist, from 1931-1958.

UW

Prof. JOSEPH J. HICKEY (A 48) (wildlife management) spent five months during the beginning of 1964 conducting research at an ornithological station near Frankfort, Germany.

Dean LINDLEY J. STILES (A 55) (education) was presented during April with the Arnold Air Society - General Muir S. Fairchild Award for aerospace education contributions.

Regent CARL E. STEIGER (L 54) (Oshkosh) was re-elected as a director of the UW Foundation at their 19th annual meeting on April 24.

Prof. THOMAS J. HIGGINS (A 59) (electrical engineering) was presented with the "Engineer of the Year" award by the Wisconsin Society of Professional Engineers at their annual meeting in April. He was also the recipient of the Donald P. Eckman Award of the Instrument Society of America at its annual meeting in New York in October "for his unceasing effort, as an outstanding teacher and biographer, to define and consolidate the various emerging areas of instrumentation and automatic control theory."

Prof. ARTHUR D. HASLER (A 40) (zoology) was elected vice-president of the zoological section of the American Association for the Advancement of Science at their spring meeting in April.

Under a recent $387,000 Carnegie Corp. grant, the UW is experimenting with the development of some new types of instruction for youths and adults who cannot come to a campus. This is a major goal of the Articulated Instructional Media (AIM) program being administered by the University Extension Division under an all-University Committee headed by IRA L. BALDWIN (A 32) (special assistant to the president and bacteriology). JOSEPH G. BAIER (A 45), UWM dean of the College of Letters & Science is also on the committee. Among the list of consultants and associates of the program are ROBERT F. ROEMING (A 57), UWM; and ROBERT TAYLOR (A 56). Participants in the 1964 AIM Fall Conference (September 30 - October 1) were: DONALD H. BUCKLIN (A 61) (zoology), and HELEN C. WHITE (A 32) (English).

Regent CHARLES D. GELATT (L 58) of La Crosse was elected vice-president of the UW Board of Regents at their meeting on June 8. Regent CARL E. STEIGER (L 54) (Oshkosh) was named as one of the regents to represent the Board on the CCHE.

Prof. JOHN GUY FOWLKES (A 44) (education) was invited by President Johnson to witness the signing of the National Defense Education Act on October 16.

Profs. S. A. WILDE (A 44) (soils) and J. G. IYER (A 64) (soils) are co-authors of Soil and Plant Analysis for Tree Culture published by the Oxford Publishing House of New Delhi and Calcutta (India) during June.

EDGAR W. LACY (A 60) (English) is a member of a UW committee working out a program of UW participation in a faculty exchange project with three southern universities.

Prof. TAKERU HIGUCHI (A 49) (pharmacy) was named Edward Kremers Professor of Pharmacy in June. Prof. Kremers (A 1891) who died in 1941, served as the director of the UW pharmacy department from 1892-1935. Prof. Higuchi received the Justin L. Powers Award in Drug Standards and Assay at the annual meeting (August 16-21) of the American Pharmacentical Association.

The name of the department formerly referred to as numerical analysis on the UW campus is now known as the Department of Computer Sciences. Prof. PRESTON C. HAMMER (A 54) continues to be chairman of the department.

WALTER A. FRAUTSCHI (A 42, L 48), Madison, was re-elected secretary-treasurer of the Board of Trustees of the Wisconsin Alumni Research Foundation at their meeting on August 6.

Thirty-five high school science and mathematics teachers ended their summer research studies on August 13 with a research colloquium at the Wisconsin Center. This was the sixth annual NSF-sponsored Research Participation Program for High School Science and Math Teachers under the direction of Prof. DONALD H. BUCKLIN (A 61) (zoology).

A gift of $19,500, representing the first of five annual contributions from the Oscar Rennebohm Foundation, Inc., was accepted by the regents on August 14. The gift was designated to support a chair in the Department of Medicine. Former governor OSCAR RENNEBOHM has been a Life Member of the Academy since 1944.

Ground-breaking ceremonies for the UW's $4.8 million Biotron were held August 27. UW Pres. Harrington turned the first sod on the site. The Biotron is a structure designed to study living organisms in a full range of controlled environmental conditions.

Birds of Wisconsin authored by OWEN J. GROMME (A 51) and published by the UW Press, received a certificate of recognition as a substantial contribution to Midwestern publishing and bookmaking by the 15th annual exhibit of the Chicago Book Clinic.

Prof. ROBERT C. POOLEY (A 51) (English) was among 13 American professors of English who met at the University of Illinois in September as a steering committee member of a continuing conference on English education sponsored by the National Council of Teachers of English.

A color film telling the story of one of the world's outstanding outdoor laboratories for scientific research - the UW Arboretum - had its premier held by the Friends of the Arboretum on September 30. The film was produced by the UW Department of Photography. Science Editor JAMES A. LARSEN (A 54) (news and publications) wrote the script for the film.

Prof. S. A. WILDE (A 44) (soils) lectured at the Soil Science Congress in Bucharest, Rumania, and the University of Prague in September.

Dir. LOUIS KAPLAN (A 56) (director of Libraries) spent 5 weeks in Europe during September and October on a hunt for books for the Memorial Library.

Prof. ROBERT A. KIMBROUGH (A 60) (English) is the author of Shakespeare's Troilus and Cressida and Its Setting which was published this fall by Harvard Press.

Prof. V. M. MELOCHE (A 29) (chemistry) continues to serve as chairman of the Wisconsin Athletic Board for 1964-65.

The annual fall meeting of the National Academy of Sciences (founded in 1863 to foster and promote the advancement of science in this country) was held on the Madison Campus October 12-14. Profs. FARRINGTON DANIELS (A 21, L 59) (chemistry) and PERRY W. WILSON (A 56) (bacteriology) were in charge of the local arrangements and program respectively. Other Wisconsin Academy members who are also members of the National Academy of Sciences are: Profs. R. A. BRINK (A 23, L 63) (genetics); JOHN D. FERRY (A 54) (chemistry); E. B. FRED (A 21, L 61) (president emeritis); S. M. McILVAIN (A 29) (chemistry); K. B. RAPER (A 56) (bacteriology); A. J. RIKER (A 57) (plant pathology); and J. C. WALKER (A 17, L 59) (plant pathology. Profs. ARTHUR D. HASLER (A 40) (zoology) and ROBERT AUERBACH (A 61) (zoology) presented papers at the sessions.

The UW regents approved initial plans for the long-awaited Elvehjem Art Center on October 16. The $3.3 million project is described as "the finest, most distinguished university art center anywhere." Construction of the building is expected to start before July 1965 with a completion goal of August 1967, and is to be paid for by gifts and contributions to a campaign conducted by the UW Foundation. CONRAD A. ELVEHJEM (A 44), the 13th president of the University died in July, 1962.

Prof. FARRINGTON DANIELS (A 21, L 59) (chemistry) delivered an honorary Sigma Xi lecture entitled "Portable Electrochemical Power" at Purdue University on October 20.

Prof. ORIE L. LOUCKS (A 64) (botany) received the 1964 George Mercer Award from the Ecological Society of America for a paper written in 1962 entitled "Ordinating Forest Communities by Means of Environmental Scalars and Phytosociological Indices" and judged outstanding by the society.

Profs. THOMAS J. HIGGINS (A 59) (electrical engineering), AARON J. IHDE (A 45) (chemistry) and ROBERT A. RAGOTZKIE (A 60) (meteorology) addressed the two-day Junior Science, Engineering and Humanities Symposium held at the Wisconsin Center November 5-6. Their presentations were entitled "The Role of Mathematics in Science and Society," "Humanities and the Sciences," and "Oceanography" respectively. The general theme of the symposium was "Youth, Science and the Future of Mankind."

Provost ROBBEN W. FLEMING (S 64) made a presentation entitled "Reflections on Labor Arbitrations" at a meeting of the Industrial Relations Research Association at UWM November 11.

The efforts of a very active Wisconsin chapter of The Nature Conservancy, Inc., Washington, D. C., has resulted in the preservation of considerable scientifically important land for use by the UW. In August, the organization presented the UW with two tracts of land. The larger tract of 237 acres of marsh and upland is located 10 miles west of Kenosha, just northeast of Paddock Lake. It will be a part of the University Arboretum, but under the management of the UW-Kenosha Center. The other tract - 30 acres in size - is an addition to the 10 acres of maple - basswood forest which the UW purchased in May with income from the J. J. DAVIS Trust Fund. This forest is known as Abraham's Woods and in located in the Town of Albany in Green Co.

A gift of 20 acres in Ozaukee Co. last April by the Nature Conservancy, Inc. for the establishment of the UWM Arboretum was enhanced by the gift of an additional 140 acres November 13.

UW Centers

The new UW-Sheboygan County Center building was used this year for summer session classes. It replaces the former center which had been held in a section of the Sheboygan Vocational and Adult School since the mid-thirties.

The UW-Marshfield-Wood County Center opened its doors for the first time at the beginning of the fall semester. The Center's new 51-room building joins the UW's eight other Center campuses. "In their total program the Centers are about as true an expression of the 'Wisconsin Idea' as you can get," UW Center System Provost L. H. Adolfson told a meeting of Center System faculty in Madison on October 3.

Ground-breaking ceremonies for the UW-Marinette Center were held October 12. The former home of the Center was in the Marinette School of Vocational and Adult Education building since 1946. The new building is to be completed by September 1965.

HENRY C. AHRNSBRAK (A 63) (dir., UW-Marathon County Center) served as keynote speaker at a conference of high school administators and guidance counselors of 12 counties in north central Wisconsin and UW faculty members and administrative officials. The conference at the UW-Marathon County Center held November 14, was one of a series held throughout the state to discuss probelms of mutual concern.

UWM

Prof. GOODWIN F. BERQUIST (A 61) (speech) was the recipient of one of the two William H. Kiekhofer Awards for excellence in teaching.

New department chairmen in the College of Letters and Science were announced by Dean JOSEPH G. BAIER (A 45) in May. Academy members include: Profs. LOWELL M. BAHE (A 61) (chemistry), ROBERT L. COSTELLO (A 56) (botany), GARETH W. DUNLEAVY (A 59) (English), HUGO O. ENGELMANN (A 59) (sociology), and ROBERT F. ROEMING (A 57) (language laboratories).

Prof. ROBERT F. ROEMING (A 57) (language laboratories) spoke at the International Conference on Teaching of Foreign Languages in West Berlin in early September.

Provost J. MARTIN KLOTSCHE (A 56) addressed the annual Wisconsin Community Newspaper Conference at Madison on October 16.

WSPE

The annual meeting of the Wisconsin Society of Professional Engineers was held in Eau Claire, April 23-25. At the annual Citation Award Luncheon, citations were presented to three groups striving to improve science education in the State. Cited were: the National Science Foundation - sponsored Academic Year Institutes at UW, accepted by DONALD H. BUCKLIN (A 61) (UW, zoology); the Wisconsin Junior Academy of Science, accepted by JACK R. ARNDT (A 60) (UW, extension); and the Southeast Wisconsin Science Fair, accepted by JEROME H. FISCHER (A 57) (Nicolet High School, Milwaukee) a member of the board of directors. Prof. PAUL J. GROGAN (A 63) (UW, engineering extension) presented the luncheon address entitled "Whole Life Education." Prof. THOMAS J. HIGGINS (A 59) (UW, electrical engineering) is chairman of WSPE's Education Committee.

WSU's

Prof. MARTIN LAAKSO (A 58) (WSU-River Falls) attended an NSF-AEC-sponsored Radiation Biology Institute at the University of New Mexico, June 15-August 14.

Name changes for the Wisconsin State Colleges became official July 1. The proper designations to use are:

Stout State University
Wisconsin State University-Eau Claire
Wisconsin State University-La Crosse
Wisconsin State University-Oshkosh
Wisconsin State University-Platteville
Wisconsin State University-River Falls
Wisconsin State University-Stevens Point
Wisconsin State University-Superior
Wisconsin State University-Whitewater

A shortened designation (WSU-La Crosse) will be used in the Review.

President WALKER D. WYMAN (A 63) (WSU-Whitewater) is co-author of The American Heritage published last spring by Lyons and Carnahan, Chicago.

Prof. LOWELL E. NOLAND (A 22, L 47) (UW, zoology) was a lecturer at the two Pigeon Lake Field Station (near Drummond) biology programs conducted during the summer by the State Universities under a grant from the National Science Foundation for 28 WSU undergraduates (June 21-August 1) and 42 high school teachers (July 2-August 12) from 15 states. Other Academy members contributing to the programs were: Profs. RICHARD T. T. FORMAN (A 64) (UW-Marathon Co. Center) and MARCUS J. FAY (A 56) (WSU-Eau Claire) field directors; KENNETH G. FOOTE (A 64) (UW-Sheboygan Center) and JACOB SHAPIRO (A 57) (WSU-Oshkosh), instructors. Two other programs were also held at the Field Station during the summer: an art education workshop and an outdoor education workshop conducted simultaneously August 13-29.

Profs. A. VINCENT WEBER (A 61) (WSU-La Crosse), HENRY MEYER (A 48) (WSU-Whitewater), GLEN V. GUNDY (A 59) (WSU-Platteville) and JAMES W. UNGER (A 53) (WSU-Oshkosh) attended a conference on July 30 at WSU-Platteville on ways to educate more high school and university students for careers in science. The conference was arranged by Prof. MARK H. INGRAHAM (A 29) (UW), a member of the National Science Foundation advisory committee. Washington representatives from the NSF were also present.

The construction of newly-designed dormitories for three Wisconsin State Universities (Eau Claire, Oshkosh, and Menomonie) have created a public relations problem. The design of the dormitories consists of two square units connected by a corridor unit. Architects and engineers have dubbed the buildings "dumbbell dormitories" because their shape is like a dumbbell weight used for exercising. This designation has also cropped up in official correspondence. Director of State Universities EUGENE R. McPHEE (A 54) (Madison) had some explaining to do when an office worker in the federal housing and home agency office in Chicago asked "Why are you building dumbbell dormitories on your campuses?"

You are invited to join the

Wisconsin Academy

WHAT IS THE ACADEMY?

The Wisconsin Academy of Sciences, Arts and Letters was chartered by the State Legislature in 1870 to encourage research, discussion and publication in the various areas of the sciences, arts and literature among the citizens of the state. Although the Academy has enjoyed some legislative support through financial grants, it is essentially a voluntary organization whose active members elect their own officers and control their own activities.

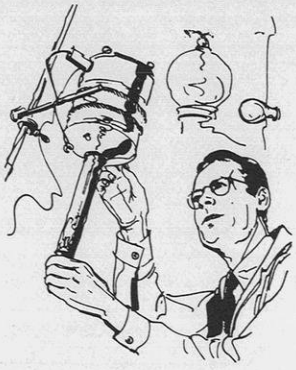
As it approaches its centennial year of service to the state, the Academy is now composed of over 1,100 individual, institutional and library memberships. Any person or group interested in its constitutional purpose, "the promotion of sciences, arts and letters in the State of Wisconsin," is invited to join the Academy.

WHAT DOES THE WISCONSIN ACADEMY DO?

The Academy annually publishes a volume of about 300 or more pages known as the TRANSACTIONS which contains original productions of Academy members. Besides free distribution to all members, this publication is exchanged with over 600 American and foreign institutions for their published materials. In this manner the Academy has established a library of over 35,000 volumes presently valued at more than a quarter million dollars. These publications are incorporated into the University of Wisconsin library and are available on inter-library loan to all citizens of the State.

The Academy also publishes the more popular quarterly Wisconsin Academy Review which is free to all members and of service to them in calling attention to the activities, accomplishments and interests of their friends and colleagues in their own or related fields.

The Wisconsin Junior Academy of Science is sponsored by the Academy through organized supervision and financial encouragement. This program operates



through over 140 science clubs containing more than 4,000 members in the public and parochial high schools of the State. Students whose science projects win at district meetings are invited to compete at the annual meeting of the Wisconsin Academy. Statewide winners receive awards and assistance in their educational program as well as membership in the Senior Academy.

All members have an opportunity to participate in the Academy's program through its committees, as an officer, as a reporter to the Wisconsin Academy Review, by publishing in the TRANSACTIONS, or by giving a paper at the annual meetings held in various cities throughout the State. The Academy is affiliated with the American Association for the Advancement of Science and is represented on its Council. It encourages original research or investigation in all fields in every way.

HOW WILL YOU SHARE IN THE WISCONSIN ACADEMY?

Even if you participate in no other activities, the Academy's publications alone are worth more than the fee for active membership. This contact through the publications will help keep you aware of new information about Wisconsin and Wisconsin people working in your fields of professional and hobby interest. If you wish, you can participate more fully in Academy activities as outlined above and receive the subsequent benefits.

WHY DOES THE ACADEMY EXIST?

We need no reminder that our contemporary world places increasing emphasis on the pursuit and communication of knowledge. There are countless professional societies of scholars which encourage this systematic attack on ignorance. But the Wisconsin Academy is unique in at least two respects. It is one of the few state academies to seek a balance between the sciences and the humanities. It is one of the few organizations whose broad base of membership includes scholars and laymen for mutual stimulation.

Many specialized organizations have developed over the years in the separate branches of scientific endeavor and in the humanities. As these relate to Wisconsin or its people, the Academy is interested in encouraging them and helping them to achieve their objectives. This affiliation in spirit is evident by the fact that Academy members are frequently officers, directors, or councilors in these specialized groups.

HOW TO BECOME A WISCONSIN ACADEMY MEMBER

In 1970 the Wisconsin Academy will celebrate its Centennial Anniversary and many present members will participate. Consideration is already being given to the significant events which will take place on that occasion. The history of the state has been enriched through the efforts and accomplishments of numerous individuals who have been proud of their affiliation with the Wisconsin Academy

If you are one of those who have a dedicated interest in Wisconsin and its institutions, and also in the pursuit of knowledge for the benefit of mankind, just fill out the attached application for membership.

Then you may belong to the Wisconsin Academy of Sciences, Arts and Letters.

Members are urged to consider using the form below for gift memberships to colleagues, friends or students. Student memberships are especially good gifts to encourage young scholars and scientists by placing them in contact with Academy members of similar interests through reading the Wisconsin Academy Review. At $1.00 each there may be several students in your family or among your acquaintances who you may wish to include. A list of names and addresses may be attached to the membership form.

THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS

Application for Membership

Mail to:

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Wis. Academy of Sciences, Arts & Letters
720 East Wisconsin Avenue
Milwaukee, Wisconsin 53202

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(date)

Enclosed find $_____ for membership dues in the classification checked at left. (Please make checks payable to the Wisconsin Academy of Sciences, Arts and Letters.)

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___ Patron, $50 or more contributed annually

___ Life, $100 or more Single paid-up membership

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___ Student, $1 annual dues

___ Library, $4 annual subscription

___ Institutional, $100 or more annual dues

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Profession and chief interest _____

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FUTURE ANNUAL MEETING SITES

May 7, 8 & 9, 1965 - University of Wisconsin at Madison

1966 - Lawrence University, Appleton
1967 - Wisconsin State University - Oshkosh
1968 - Wisconsin State University - Eau Claire
1969 - Wisconsin State University - Whitewater
1970 - University of Wisconsin at Madison

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WANDERLUST

by

P. C. Phillips
Sun Prairie

Oh wild geese, I hear your call, tantilizing, wild and free.
Floating to me on the soft, March night air.
While I stand listening, mired in my small world.
If I could but take wing and follow your uncharted pathway through the skies.
To that far distant rendezvous of all winged travelers of the blue.
Tomorrow is just another tomorrow to you on your free winging way.
But I, I must linger here.
Tied by Lilliputian strings to a Lilliputian existence.