



# THE SIGMA ZETA

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NUMBER 2

## A MESSAGE

*from the Grand Master Scientist*

May I take this means of extending to the various chapters of Sigma Zeta my greetings and sincere thanks for the honor they have extended me. Due largely to the graciousness and hospitality of the Epsilon Chapter officers and members and the efforts of our Past Grand Master Scientist, the sixteenth annual conclave, at Otterbein College, was a notable success. There is no reason why Sigma Zeta may not look forward to a year of further growth, further accomplishment, and increased prestige in its field. The Grand Officers solicit the help and hearty cooperation of each chapter toward these ends.

(Signed) J. L. Glathart

## THE SIGMA ZETAN

Published bi-annually in the interest of Sigma Zeta,  
National Honorary Science Society

## GRAND OFFICERS — 1941-42

Grand Master Scientist .....	J. L. Glathart (Alpha) Alton, Illinois
Grand Vice Master Scientist .....	W. H. Eiler (Kappa) Macomb, Illinois
Grand Recorder-Treasurer .....	T. A. Rogers (Zeta) Stevens Point, Wisconsin
Grand Editor .....	G. W. Faust (Zeta) Stevens Point, Wisconsin
Grand Historian .....	S. M. McClure (Beta) Lebanon, Illinois
Past Grand Master Scientist .....	A. J. Esselstyn (Epsilon) Westerville, Ohio

## FOUNDERS' CUP

Here are two self-explanatory excerpts from letters which the Grand Recorder-Treasurer has received from Professor R. K. Carelton, who is one of the men responsible for the founding of Sigma Zeta. Mr. Carelton is now in the Chemistry Department at the Rhode Island State College, Kingston, R. I.

"The thought occurred to me yesterday that I should like to see a prize or award of some kind established to be given to the delegate to a conclave who was chosen as the most outstanding in the field of science. This award might be the first of several that might come later. What I was thinking of in particular was the possibility of giving a cup which would be known as the Founders' Cup and might be sponsored jointly by the three of us who started Sigma Zeta—Professor Ellis Powell of Michigan State; Professor List and myself. I didn't have sufficient time when I talked to Professor List, but I am writing him now about this thought of mine to see what his re-

action might be. I'll also write to Professor Powell . . . ."

And from a later letter . . . .

"Regarding the establishment of a Founders' award (probably in the form of a cup) may I say that Professor List of Shurtleff College is heartily in favor of the idea and said in a recent letter that 'I could count on him.' I have not received a reply from Professor Powell yet, but I should like to say this, that everything else being equal, I shall be responsible for the award being made at the conclave next year. I expect to discuss the matter at some length with Professor List when I get to Alton in June and we will work out rules, etc., at that time and also will attend to other details. I thought, however, that possibly you might wish to have some mention made in the next issue of the Sigma Zeta, so you may, if you wish to state it in that way—that I shall see to it that such an award is made available next year, even though Professor Powell may not come in with Professor List and me."

# MINUTES of the 1941 Conclave

*of the Society of Sigma Zeta*

The sixteenth annual Conclave of the Society of Sigma Zeta was called to order at 9:00 A. M., April 18, 1941, at Otterbein College, Westerville, Ohio, with Epsilon Chapter as host. The Grand Master Scientist, A. J. Esselstyn, presided.

Registration statistics revealed that the following chapters were represented: Alpha, Beta, Epsilon, Zeta, Kappa, Lambda, Nu, Xi, and Omicron.

Dr. John Wenrick, Dean of Otterbein College, presented the official greetings of the College, stressing in his remarks the need of the search for truth.

The minutes of the previous Conclave were approved as published in the Sigma Zetan for May, 1940.

The reports of the Grand Historian and the Grand Recorder-Treasurer were deferred.

The Grand Editor reported that the cost of publishing and distributing the pre-conclave issue of the Sigma Zetan would not exceed \$35.00, and that a post-conclave issue would be prepared. This issue would include the minutes of the Conclave, and abstracts of the student papers presented, as well as other material.

## Committee Reports

The chairman called for reports of the committees which were appointed at last year's Conclave.

There was no report from the Committee on Expansion and Promotion, and the report of the Ritual committee was postponed until the following day.

As chairman of the Publicity committee, the Grand Editor reported that little had been done, and suggested that publicity, at least for the Conclave, be placed in the hands of the persons responsible for the Conclave program.

The committee on Baird's Manual reported that its work had been completed and that information on Sigma Zeta had been presented to the editors of the Manual.

The Alumni committee's report was read. Discussion of alumni problems revealed that few chapters have adequate alumni files. Ep-

silon, Zeta, and Kappa reported that they have files, and Lambda is planning a news letter to keep in contact with alumni. A motion to adopt the committee's report and continue the committee was carried.

The report of the Policy committee was read. It was pointed out that several of these policies were already in effect, particularly those referring to the Conclave. A discussion of the section on honorary membership brought up the problem as to what to do with graduate students in those institutions which offer graduate study. Should active or honorary membership be extended to graduate students who are scholastically eligible for membership in Sigma Zeta, but who have come from institutions where there is no chapter? Mr. Edwards moved that the report be accepted and the committee continued. Mr. Schear seconded. The motion was carried.

Mr. P. D. Edwards, Past Grand Master Scientist, presented the official gavel to Mr. Esselstyn; a copy of the description of the gavel was made available for each member at the Conclave.

#### Temporary Committees

The chairman appointed the two committees which were to act before the Saturday session: Nominating committee, H. W. Gould, chairman, F. A. Hanawalt, and G. W. Faust; Auditing committee, D. E. Miller, chairman, Williard Warrington, and Nelson Russell.

Mr. Gould explained that if the nominating committee were to follow the policy of recommending a member of the host chapter for next year's conclave as Grand Master Scientist, it must have some indication as to next year's host. He therefore asked that an invitation for the 1942 Conclave be presented immediately. It was then announced that Omicron Chapter in Washington, D. C., had extended an invitation. Discussion revealed that Omicron would be unable to furnish accommodations and that attendance at a meeting in Washington would be out of the question for most chapters. No action was taken.

A recess was declared so that pictures of the group could be taken.

Following the recess it was moved by Mr. Sheski that a copy of the Conclave picture be sent to each chapter. The motion was seconded and carried.

#### Student Papers

The remainder of the Friday morning session was devoted to presentation of the following papers: "Science and Man," Merville Meverden, Zeta Chapter; "Experience in Micro-technique," Donna Belle Risk, Xi Chapter; "A Practical Elementary Method for the Calculation of Pi,"

Alice Marie Clark, Xi Chapter; "Influence of Geography on War," Olive Leskow, Xi Chapter; and "Plastics," Charles V. Banks, Kappa Chapter.

The business session was adjourned until 9:00 A. M., Saturday.

#### Afternoon and Evening

The afternoon was spent on tours of the Ohio State University campus, the Batelle Memorial Institute, the G. F. Smith Chemical Company, the Aerated Products Company, the Ohio Historical and Archeological Museum, and the Perkins Astronomical Observatory at Delaware, Ohio.

The annual Banquet was held in the evening with Dr. Alva W. Smith, Department of Physics, Ohio State University, as the speaker. He was followed by several musical numbers and informal reports from the various delegations represented. A dance was held after the banquet.

#### Ritual

The business meeting was resumed at 9:00 Saturday morning. The Ritual Committee, E. W. E. Schear, chairman, J. L. Glatthart, and S. M. McClure, presented its report. The committee recommended that a letter of information regarding Sigma Zeta be sent to the prospective candidate along with an application blank. Two rituals were presented. One is very short, contains no allegorical material, and merely presents the purposes and functions of the society. This was proposed as a minimum form which the chapters may expand as they see fit. The second is considerably longer, contains much allegorical material and considerable ritualistic work. In neither case is there to be any "horse play" or informal initiation. The committee recommended that these two forms of initiation be tried for a year. Mr. Edwards moved that the report be

accepted and that a Ritual committee be continued. The motion was seconded and carried. Copies of the two forms will be made available to each chapter.

The Auditing committee reported a discrepancy in the Recorder-Treasurer's accounts which it could not track down, and requested the Recorder-Treasurer to rectify the error.

The chairman announced the appointment of a new committee on Expansion and Promotion: D. E. Miller, chairman, P. D. Edwards, and T. A. Rogers.

It was moved that the Recorder-Treasurer should inform each chapter, each of the Grand Officers, and each committee member, of the personnel and addresses of the committees and the person in each chapter to whom correspondence can be sent. The motion was seconded and carried.

It was moved that a new Ritual committee be appointed. The motion was seconded and passed.

#### Election

The nomination committee presented the following slate of officers for 1941-42:

Grand Master Scientist: J. L. Glatthart, Alpha Chapter.

Grand Vice Master Scientist: W. H. Eller, Kappa Chapter.

Grand Recorder-Treasurer: T. A. Rogers, Zeta Chapter.

Grand Editor: G. W. Faust, Zeta Chapter.

Grand Historian: S. M. McClure, Beta Chapter.

Past Grand Master Scientist: A. J. Esselstyn, Epsilon Chapter.

A motion was made, seconded, and carried that the report of the nominating committee be adopted.

Mr. Edwards moved that the Grand Chapter extend its thanks to Epsilon

Chapter and its officers for the hospitality extended during the Conclave. The motion was seconded and carried by rising vote.

Robert E. Waites, Master Scientist of Epsilon Chapter, spoke on behalf of the chapter, expressing the hope that everyone had had a good and profitable time.

It was announced that the Grand Council would select the time and place for the next Conclave. Mr. Eller requested an opinion on the place of the meeting. Mr. Gardner moved that the Conclave go on record as favoring a meeting at some college rather than at a hotel or state park. The motion was seconded and carried.

Mr. Gould moved that \$50.00 be appropriated to the Grand Recorder-Treasurer to defray the expenses of his office. The motion was seconded and carried.

After a brief recess, the following papers were presented: "Charlestown, The Ghost Town of Southern Indiana," Betty Harroff, Xi Chapter; "The Inheritance of Hair and Eye Color," Virginia Garst, Xi Chapter; "Maggott, Allantoin, and Urea Therapy," Leslie Meckstroth, Epsilon Chapter.

A motion for adjournment was carried, and the 1941 Conclave was adjourned at 11:30 A. M., April 19, 1941.

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**In addition to the papers presented in this issue, Donna Belle Risk of Xi Chapter spoke on her "Experiences in Microtechnique."**

## STUDENT PAPERS

### SCIENCE AND MAN

By Merville Meverden, Zeia Chapter  
Presented at the National Conclave,  
Westerville, Ohio, April 18, 1941

(The author is deeply indebted to Dr. A. J. Carlson for providing in his article "Science Versus Life" the data presented in a different light in this paper.)

This article was not written with the intention of sugar-coating known facts, but rather for the purpose of pointing out how little science has accomplished in comparison to what it might have accomplished.)

What is science?—Just facts, and a method with its controlled and rechecked observations and experiments, objectively recorded with absolute honesty and fearlessness.

What is man?—Just a bundle of emotions, greed, hate and superstition.

A group of these same men fought fearlessly for a century and a half the blind forces of nature which lead men on and on into the world of fear, hate, greed and superstitions. They struggled incessantly at establishing a new age, in which all mankind could act and think logically and scientifically, free from fear of the unknown. The big question is, "Was that group successful?"

It is my contention that this group has thus far failed in one attempt. It has not only been unsuccessful in convincing the general public of the benefits derived from the spirit of science, but it has failed to convince itself. I shall endeavor to prove to you that so-called scientists, to say nothing about the general public, still hold within their bosoms that bundle of fear, greed, hate, and superstitions. The great mass of people are as innocent of the understanding of science as the "Peking Man" of a million years ago. I shall bring to

view six outstanding examples which point to that failure.

**First:** A doctor in the northern part of Wisconsin prescribes whiskey as a cure for aches, pains, and all forms of disease.

**Second:** A doctor in the south prescribed Lydia Pinkham's vegetable compound as a cure for anemia.

**Third:** In a recent volume the Dean of Canterbury says, "Our social and economic order is neither scientific nor Christian. When I read as a headline in the Observer that Poland's good harvest was a severe blow to recovery, I recalled the words of an American professor of agriculture after seeing ten million acres of cotton plowed under and five million pigs slaughtered, 'If this will bring national prosperity, then I have wasted my life.' The thing is monstrous, an age when science is frustrated."

**Fourth:** At the late Century of Progress Exposition in Chicago, the shops of astrologers and fortune tellers had a record attendance. Wishful thinking is apparently on the increase.

**Fifth:** We think of science, in spirit and method, as having no political or national boundaries. Yet we hear claims from Germany of a special teutonic physics and claims from Russia of something called Marxian genetics.

**Sixth:** In the bulletin of the Association of American Colleges for December, 1935, there is an article entitled "The Alumni Go To College." In this article are resumes of faculty offerings to the alumni of their schools. Out of the eleven such resumes, only one "An Excursion Into the Field of Biology," was given in the field of science. The rest remind us of "Learning and Lollipops."

pops."

How long will this deplorable situation continue to exist? As I see it, it will continue until three modifications can be effected.

**First:** Scientists themselves must adopt strictly the scientific method of thinking.

**Second:** The character of the prevailing education must change. One can teach a parrot how to talk English, French, German, or Latin, but he is still a parrot.

**Third:** Man's tremendous resistance to new ways of thinking must be overcome. Man has been exposed too long to the forces of fear and superstition to be readily converted to these new ways of thinking.

In conclusion, may I join Dr. A. J. Carlson in saying, "We cannot deny the possibility, and we will nurse the hope, that the hairy ape who somehow lost his tail, grew a brain worth having, built speech and song out of a hiss and a roar, and stepped out of the cave to explore and master the universe, may some day conquer his own irrational and myopic behavior."

### PLASTICS

By Charles V. Banks,

Kappa Chapter

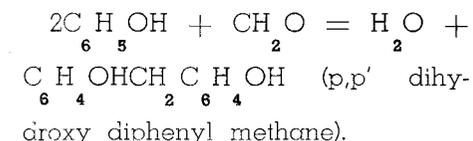
Presented at the National Conclave,  
Westerville, Ohio, April 18, 1941

Most of the materials used by man are produced by nature and merely collected and refined by man and then put to the various uses that he finds for them. It is different with plastics because they are not found anywhere in nature and come near-

er than any other material to being man-made.

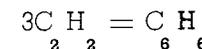
Before we can say much about plastics we must get acquainted with some of the nomenclature used in connection with this relatively new industry.

A synthetic resin is one which in general appearance resembles the natural resins, such as rosin or the copals. A resin is formed when phenol reacts with formaldehyde in the presence of either acid or alkaline catalysts. The reaction may be represented as follows:



A plastic material, as defined by George H. Brother (1) is, in general, "a mixture or combination of organic compounds or substances, which under the combined and simultaneous influence of heat and pressure, becomes sufficiently fluid to permit forming to shape."

Polymerization is the reaction whereby single molecules are linked to form large molecules without any change in chemical composition, e.g., when acetylene is passed through a red hot tube with Fe-Si-Cr catalysts, benzene is formed.



Condensation, in general, is the reaction by means of which a compound gains more carbon atoms. Usually such a union is followed by loss of water, alcohol, or other substance, thereby yielding an unsaturated compound.

Plastic materials are divided into two general classes, the thermoplastic and the thermosetting. Thermoplastic materials may be softened

by the action of heat and pressure without undergoing chemical change. They may be remelted and remolded again and again and may be considered permanently fusible. The cellulose derivatives, vinyls, indenes, and most of the natural resins are thermoplastic. The thermosetting material is one that is formed by a non-reversible chemical reaction. The material "sets" or cures on the application of heat, producing an infusible material. The phenolics and ureas are thermosetting plastics.

The history of the plastics industry is very interesting. In 1846 Schonbein discovered nitrocellulose when in Switzerland as Professor at Basel. In 1862 Parkes exhibited some nitrocellulose articles in London. John Wesley Hyatt was inspired by a \$10,000 prize offered, in 1868, for a substitute for ivory to be used for billiard balls. As a result he developed a new material by treating cotton cellulose with nitric acid. He called his new material celluloid. This is usually considered to be the first plastic material, and from this comes the expression that "the plastics industry was born in a pool room."

In 1890 Adolph Spitteler of Germany produced the world's second plastic, a casein material, by mixing sour cow's milk with formaldehyde.

The third plastic was produced from phenol and formaldehyde by Dr. Leo H. Baekeland in 1909, and was called Bakelite. From this time on, the growth of the plastics industry has been very rapid.

Plastics may be classified into four broad groups — namely, synthetic resins, cellulose derivatives, protein substances, and natural resins.

The synthetic resins, combined with suitable fillers and then molded, yield products that have varied phys-

ical properties which make them well suited for use in manufacturing a variety of different objects.

The cellulose derivatives include celluloid which is usually considered to be the first plastic.

The third group, the protein plastics, come from casein, soy beans, and similar things such as zein, the prolamine from corn.

The last group, the natural resins, is made up of shellac, rosin, asphalt, and pitch.

What materials are used in making plastics? This question may be partially answered with the following list of materials: binders, fillers, dyes, pigments, plasticizers, solvents, hardeners, lubricants, accelerators and catalysts.

The cellulose binders are made from cotton linters or from pulped wood. The latter materials cannot be made from coal, air, water, coke, limestone, etc., in man's laboratory, but they are made from carbon dioxide and water with the aid of the energy from the sun and with chlorophyll as a catalysts in nature's laboratory, the plant.

A plasticizer is a substance used in a mixture to keep it viscous. Ott (4) says the plasticizer solvates the cellulose chain and thus reduces the force holding a given chain to its neighbor.

Let us first look at some of the thermosetting plastics such as the phenol-formaldehyde, furfural-phenol, and the urea-formaldehyde plastics.

The phenol-formaldehyde plastics are made from phenol and formaldehyde with "hexa" or hexamethylenetetramine as the catalyst.

Of course other phenols such as the cresols, xylenol, betanaphthol, resorcinol, and 1,2,3-trihydroxybenzene may be used with other alde-

hydes such as acetaldehyde, benzaldehyde, acrylic aldehyde, furfuraldehyde and some ketones such as acetone.

The furfural-phenol plastics are similar to the phenol-formaldehyde plastics.

The urea-formaldehyde plastics were developed in order to get lighter colors than were possible with the phenolics. Urea reacts with formaldehyde in the presence of alkaline catalysts to give resins. Heating the methylol urea or dimethylol urea thus formed results in the loss of water and the formation of vitreous, high molecular weight products. Polymerization takes place and giant molecules are formed.

Let us now turn to some of the thermoplastic materials such as cellulose acetates, cellulose nitrates, styrenes, vinyl resin plastics, indenes, acrylates, casein plastics, and others.

Hoff (7) and Ott (4) give the structure of cellulose as being a large number of beta-glucose anhydride units linked together through oxygen bridges. When esterification takes place the hydrogens of the hydroxyl groups are replaced by the acetyl radical or the nitro group as the case may be. Since esters hydrolyze with water, the OH groups are sometimes replaced by ether groups.

The polystyrenes are made from styrene which is also known as phenylethylene or vinyl benzene. The monomer styrene has the property of polymerizing to form polystyrenes. The active group in this polymerization is the vinyl radical,  $-\text{CH} = \text{CH} \cdot$

Another type of plastics that contain the vinyl group is known as the vinyl resin type. This type of

plastics is usually made by co-polymerizing vinyl chloride with vinyl acetate.

The indene-cumarone plastics are made from naphtha and sulfuric acid. The constituents of naphtha that are active in the formation of this type of plastics are indene and cumarone. Since both of these materials contain substituted vinyl groups it is believed that the mechanism of the polymerization might be similar to that of the other vinyl compounds.

The acrylates are also characterized by the presence of the unsaturated vinyl radical. The important acrylate plastics come from the esters developed by Dr. Otto Rohm of Germany. The acrylates are usually made by the polymerization of the monomeric derivatives of acrylic acid,  $\text{CH}_2 = \text{CHCOOH}$ , and methacrylic acid,  $\text{CH}_2 = \text{C}(\text{CH}_3) - \text{COOH}$ .

The free carboxyl groups are usually changed to ester groups to increase the resistance toward water and alkali.

The casein plastics are made from casein and formaldehyde. The formaldehyde is believed to react with the amine groups of the casein to form derivatives which are less affected by water than the casein itself.

If we consider the celluloid developed in 1868 by John Wesley Hyatt as the first plastic material, then we can see that the plastics industry is only about 73 years old. Great developments have been made in these relatively few years, especially the last few.

It is hard to even estimate what the future holds for the plastics industry, for today chemists are able to make resins with properties that

only a few years ago would have seemed incredible.

We do not know what the future holds, but we can be reasonably sure that great advances will take place.

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### INFLUENCES OF MINERAL RESOURCES ON WAR

By Olive Leskow, Xi Chapter

Presented at the National Conclave,  
Westerville, Ohio, April 18, 1941

Some of the most important causes of recent wars lie in the field of geography. Nations in reality form one great world family, but there are and always will be individual interests and selfish desires. For this reason nations are often interested in merely getting a foothold on another continent in hope of future benefits. Also from the geographic point of view nations seize other lands in order to have markets for their manufactured goods and in order to obtain raw materials and mineral resources.

In this paper I have considered the importance of minerals in war. One contributing cause of the recent wars is the international rivalry for the control of mineral resources and channels through which these resources can be obtained. During the World War nations realized that minerals were not everywhere to be found. They began to guard more closely against possible attacks the

few adequate sources which they had available.

Why should nations in time of war be interested in minerals? In the first place iron because of its strength, hardness, and magnetic properties is used in the making of almost all arms. Steel, an iron alloy, is used in making war tanks. Aluminum, which has become especially important in recent years because it is light in weight and yet very durable, is used in making airships and airplanes. Natural nitrates and petroleum are both used in making explosives.

Unfortunately these minerals are very unevenly distributed throughout the world. Some of the greatest deposits are concentrated in North America and north west Europe. This may be a blessing, because minerals occur in climates which are favorable for human progress. However, a few very valuable deposits are found in countries removed from the countries of consumption such as nitrates in Chile, iron ore in the Brazilian highlands, and copper in the Congo Basin. The United States gives to the world about 60% of its petroleum. Europe has very little petroleum on the mainland.

Although Europe is supplied with many of the great minerals, she is presented with the problem of distributing these evenly among her approximately 35 political divisions. These divisions of nations are so different in language, ideals and customs that they do not cooperate, but work only for their own benefits. When this cooperation is obtained, when each nation realizes that she owes to herself and the world to develop her resources so that all nations can share in what Nature has given to the world, then and only then, will the war have accomplished its true objective.

### THE INHERITANCE OF HAIR AND EYE COLOR

By Virginia Garst, Xi Chapter

Presented at the National Conclave,  
Westerville, Ohio, April 19, 1941

Data from four generations of a family relative to eye color and hair color were secured either by direct observation or from members of the family who knew about the individuals in question.

In this family history there were 17 children born to marriages where both parents were blue-eyed, and all 17 were blue-eyed; to the blue x black marriage there were born three brown-eyed children, and one black-eyed child; to the blue x brown marriage there were born one brown-eyed and one blue-eyed child; to the blue x hazel marriage were born four blue-eyed children and one green-eyed child. This evidence indicates that the following is the order of dominance of inheritance of eye color: Black, brown, blue. Probably hazel eye is caused by an extra yellow-eye gene working with a brown gene or genes, while green is caused by this extra yellow gene working with the blue-eye genes. This study of eye color adds nothing new to the information in the field, but corroborates what other investigators have found.

As regards hair color, there were nine brown-haired and five black-haired children born to the black x brown marriages; to the blond x brown marriages were born three blond and three brown-haired children; to the brown x brown marriages were born three brown-haired children; and to the black x blond marriage was born one child, a blond. This data would indicate that brown is recessive to black; there is no evidence to show that

it is not also recessive to blond. As a matter of fact, though this study does not show it, blond is recessive to the darker-haired conditions, according to the theories held by most geneticists today.

The limitations of this method of genetic investigation are obvious, yet it is one of the more important methods open to the student of human genetics.

### CHARLESTOWN, THE GHOST TOWN OF SOUTHERN INDIANA

By Betty Haroff, Xi Chapter

Presented at the National Conclave,  
Westerville, Ohio, April 19, 1941

Charlestown, location of a new government munitions plant, is located in southern Indiana near the Ohio River and about fourteen miles from Louisville, Kentucky.

In the summer of 1940 the United States Government signed a contract with the DuPont Company for a powder plant at Charlestown, and DuPont agreed to build this plant on a cost plus fixed fee basis and to operate it for the government. Among the reasons Charlestown was chosen as the site of the new factory were the following:

(1) Availability of cheap land; this area is rugged in character; the bed rock is near the surface, the streams are canyon-like and there is a slope to the west at the rate of about 15 feet to the mile.

(2) Relative proximity to a large city, Louisville, which supplies communication and transportation lines, as well as many other facilities and makes supplies easily available.

(3) Widespread unemployment in the surrounding area, due to the

poor land and the unemployment in the cities and towns.

It is easy to see the reason for the plant. In a modern war, an army of 1,200,000 men will use 600,000 pounds of smokeless powder in every day of fighting. The total present U. S. productive capacity available to the army is 50,000 pounds a day. That is the reason and it will cost approximately \$75,000,000.

There are three shifts of workers every day. Unskilled men get sixty cents an hour, skilled men up to \$1.50 an hour. Everyone works forty-eight hours a week and gets overtime pay for eight of them.

The greatest problem is traffic. Workers drive as many as sixty miles and the roads aren't equal to the load. Next to traffic is housing. Every shack and shed has been rented, board and bed bring \$9 to \$10 a week. Houses that formerly were unrented at \$10 or \$12 a month have been snapped up at \$20 to \$30. Trailer salesmen have been doing a land office business.

The DuPont contract with the Federal Government, supervised by the army, covers the contract of the plant and its operation for a year. After that, operation may continue in whole or in part, or the whole works may be shut down. In any case the property belongs to the United States Government and the local community derives no tax benefits from it.

Before the boom the town was made up of 850 people; now there are 4,000 and the town is growing every day. Many people are interested in what will become of these people when the captains and kings depart.

## MAGGOTT, ALLANTOIN, AND UREA THERAPY

By Leslie Meckstroth,  
Epsilon Chapter

Presented at the National Conclave,  
Westerville, Ohio, April 19, 1941

At frequent intervals during the last three hundred years it has been reported that wounds infested with blow-fly maggots heal more rapidly than maggot-free wounds.

In 1929 a Baltimore surgeon used the treatment as last resort in two cases of osteo myelitis. Recovery was so rapid and satisfactory in both cases that the treatment was widely publicized, intensive research was started and laboratories were set up to breed a commercial supply of sterile maggots for surgical purposes.

The maggots stimulate drainage of the wound, live on necrotic tissue and thus remove it from the wound, eat bacteria and kill them in their alimentary tracts and increase the rate of granulation. Not the least interesting fact is that, despite the environment, the alimentary tracts and the feces of the maggots are sterile.

In spite of the beneficial results obtained with maggots, the treatment is repugnant, often painful and always costly because of the care required. Efforts were therefore made to find the active substance or substances in the body fluids of the maggots and in their feces. Filtered juices from crushed maggots were found to be fully as effective as the maggots themselves, but were much more costly to use. Investigation revealed that these juices contained allantoin, the end product of the nitrogen metabolism of the maggot and an oxidation product of uric acid.

Allantoin is non-irritating, tasteless and odorless. The treatment with it is painless, wound discharge is reduced within two or three days, offensive odors disappear and pinkish granulation begins to appear.

In addition to allantoin the investigators also found urea, commercially known as carbamide, in the maggot secretions. This was tried and found to be so effective that it has almost entirely replaced the more costly allantoin. It is used in solution, in ointments and in jellies which are applicable in the treatment of non-healing wounds such as infections of the eye, ear, nose and mouth, osteomyelitis of all parts of the body, infected heat and X-ray burns, varicose and diabetic ulcers, and certain skin conditions such as eczema and athlete's foot.

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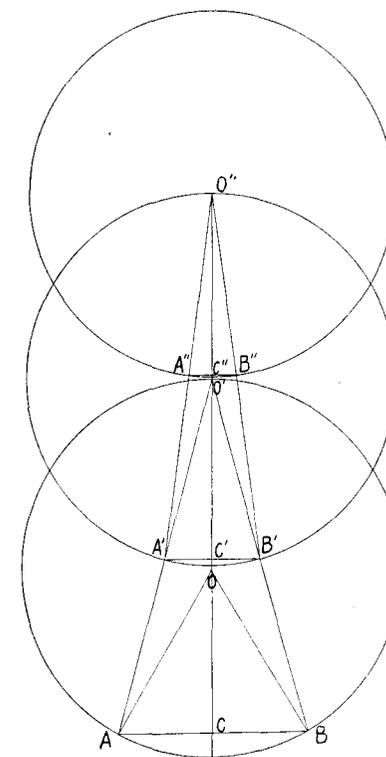
## A PRACTICAL METHOD FOR THE CALCULATION OF PI

Alice Marie Clark, Xi Chapter

Presented at the National Conclave  
at Westerville, Ohio, April 18, 1941

Of the various methods that have been devised for the calculation of pi, those that depend on the Calculus are the most satisfactory from the standpoint of actual calculation, but are beyond the understanding of students of Plane Geometry. The method of Archimedes is based on elementary theorems and is usually included in high school texts but is of little practical value because of the difficult computation involved.

The method presented here was devised by Cardinal Cusanus who died in 1464. It is based on a few simple theorems of elementary geometry and depends on two recursion formulas for the apothem and radius of a sequence of isoperimetric inscribed regular polygons. The actual calculations involved in computing the value of pi to five decimal places can be carried out in less than one hour.



### Construction

Let AB be a side of a regular n-gon inscribed in a circle with center O. The mid-point of AB is designated C. Erect the perpendicular bisector CO and call the intersection with the

major arc AB O'. Draw AO' and BO'. Call the midpoints of AO', CO', and BO' A', C', and B', respectively. Then by elementary theorems it can be shown that A'B' = 1/2 AB and angle AO'B = A'O'B' = 1/2 AOB. Hence A'B' is the side of a regular 2n-gon that may be inscribed in a circle with center O' and radius O'A'. Further this 2n-gon has the same perimeter as the original n-gon. The apothem of the 2n-gon is O'C'.

If the process be repeated indefinitely a series of isoperimetric regular inscribed polygons results which approach more and more closely their circumscribed circles. In the method devised by Archimedes the circle remains fixed and the perimeter of the polygons varies. Essentially the two methods are quite similar. The advantage of the method of Cusanus rests on the fact that the resulting formulas are much simpler.

**Recursion Formulas**

Denote the apothem of the initial n-gon by r<sub>1</sub> and the radius by R<sub>1</sub>.

In like manner denote the apothem and radius of the kth polygon (which has n·2<sup>k-1</sup> sides) by r<sub>k</sub> and R<sub>k</sub>.

From the drawing we have

$$O'C' = r_2 = \frac{1}{2}O'C' = \frac{1}{2}(r_1 + R_1),$$

and in general (I)

$$r_k = \frac{1}{2}(r_{k-1} + R_{k-1}).$$

Also

$$\begin{aligned} O'A' &= R_2 = \frac{1}{2}O'A \\ &= \frac{1}{2}\sqrt{(R_1 + r_1)^2 + (R_1 - r_1)^2} \\ &= \sqrt{R_1 r_1} \end{aligned}$$

and in general (II)

$$R_k = \sqrt{R_{k-1} r_k}$$

**Calculation**

Beginning with a regular inscribed hexagon inscribed in a circle with R = 1 and therefore r = .866 0254 the values of R and r for a 12-gon may be computed. From these the values of R and r for the 24-gon may be computed. In turn the values may be found for polygons of 48, 96, . . . sides. Since the polygons are isoperimetric, the perimeter of all will be the same as that of the first, namely 6. The circumferences of the inscribed and circumscribed polygons are respectively 2r and 2R times pi. Moreover they are less than and greater than the perimeter of the polygon; Hence pi always lies between 3/r and 3/R.

Applying the recursion formulas ten times leads to the values of r and R for a polygon of 6144 sides having the perimeter 6. Dividing 3 by each of these values we find

$$3/r = 3.141 5928$$

and

$$3/R = 3.141 5925.$$

Since pi lies between these values we know its value correct to six decimal places.

With the aid of a table of logarithms the entire process of calculation required a little more than one hour and the result is correct in the first seven places.

For a rigorous proof that R and r actually approach the same limit the reader is referred to the discussion in "Das Grenzgebiet der Elementaren und Hoheren Mathematik" by K. Kommerell. (Leipzig, 1936)

**GRAND COUNCIL PROCEEDINGS**

This is merely a summary of the suggestions which were made by the Grand Council after much lengthy discussion. The Council met in two sessions, to which other faculty members were also invited. The first was held on Thursday evening, and the second on Friday evening, April 17 and 18, 1941, at the Sixteenth Annual Conclave at Otterbein College, Westerville, Ohio. Grand Officers in attendance were A. J. Esselstyn, J. S. Glathart, P. D. Edwards, and G. W. Faust.

**Expansion and Promotion**

The matter of expansion and promotion received considerable attention. It was agreed that, by and large, expansion is a matter that is most easily and effectively handled by personal contacts on the part of individual members. Nevertheless, there should be a committee to organize and direct a program of expansion. It was suggested that forms be provided for petition for a chapter, so that such forms can be included in letters written to prospects. It was recommended that the council make an effort to "regionalize" expansion, and that a new committee on Expansion and Promotion be appointed. The chapters in Minnesota, Wisconsin, Illinois, Indiana, and Missouri could comprise one region, and those in Ohio, Pennsylvania, West Virginia, and the District of Columbia could comprise another.

**Larger Grand Council**

The matter of enlarging the Grand Council to include a representative

from each chapter received considerable attention. Such a council would be more representative and better able to conduct the business affairs of the society in the interim between conclaves. It was suggested that a council meeting could be held in the winter, perhaps in connection with the meeting of the American Association for the Advancement of Science, and could deal with many of the affairs of the society, leaving the conclave free for presentation of student papers, research reports and other matters of an educational nature. In order to provide more continuity on the council, the following plan was proposed: The Grand Recorder-Treasurer, the Grand Historian, and the Grand Editor should hold office over a period of years as at present, the Vice Master Scientist should be selected from the chapter which is expected to entertain the conclave and should be advanced to Grand Master Scientist the following year, and to Past Grand Master Scientist after that, as provided in the Constitution. Thus a three year tenure is provided for an individual in these offices. A change in the names of the Grand Officers was also discussed. It was felt that such high-sounding names as Grand Master Scientist are out of place in such an organization. Because these suggestions involve changes in the constitution, it was proposed that no action be taken now, but that a definite proposal covering these points be submitted next year with the necessary constitutional amendments.

Since the Grand Editor acted as

Recorder-Treasurer in the absence of T. A. Rogers, a motion to pay his transportation expenses to the conclave was carried.

A motion authorizing a smaller membership certificate was also carried.

After an explanation of the manner of handling keys through the Recorder-Treasurer's office, the council voted its approval of the method.

It was suggested that in addition to the annual report required in the spring, the Grand Recorder-Treasurer require a report at the beginning of the school year, the primary purpose of which would be to get a record of chapter officers on file in the national office.

#### Next Year's Conclave

Considerable discussion on the lo-

### *A Letter*

"Since the Kappa Chapter had such a large delegation present at the National Conclave, we thought perhaps it would be better to send a composite letter than individual ones.

"Here are some of the comments:

'I think Otterbein should be congratulated on providing accommodations for such a large group.'

'I enjoyed the entire Conclave, but I thought the various papers were especially stimulating.'

'I felt that the presentation of papers on various subjects promoted the professional atmosphere of our sessions.'

'The field trips were as educational as they were enjoyable. The Battelle Institute proved especially interesting to our group.'

'It was a pleasure to meet dele-

gation of next year's Conclave followed. It was felt that the invitation of Omicron Chapter could not be accepted on account of the distance and the difficulty of housing. The possibilities of Turkey Run State Park in Indiana were discussed at length. Alpha Chapter expressed the desire to entertain the Conclave in 1943, and Nu Chapter expects to extend the invitation for 1944. It was moved that the location of next year's conclave be decided by the new council. The motion was seconded and carried.

It was suggested that a folder of material on the history, organization, and operation of the society be sent to the new Grand Master Scientist so that he can more intelligently approach the problems of his office.

gates from so many colleges.'

'The meetings were inspirational, the food delicious, and the weather grand.'

'Collectively, may we congratulate Epsilon Chapter on the success of the Conclave.'

#### "The Kappa Delegation"

"In my opinion this year's National Conclave was very successful. I enjoyed the entire program that the Otterbein Sigma Zeta prepared for us. I was made to feel at home by the fellows that stayed at the Bercaw House and by Mrs. Bercaw herself. I would like to thank Otterbein College for the grand time I had and for the hospitality extended to me while on her campus for the Sigma Zeta Conclave of 1941."

**Charles V. Banks**  
Macomb, Illinois

## COMMITTEE REPORTS

### REPORT OF THE ALUMNI COMMITTEE

At the 1940 Conclave a committee on alumni relations was appointed by Dr. Edwards. The report which we are able to make at this time is not complete. It has been suggested that the alumni be given recognition in the membership classification of Sigma Zeta. While we agree that an accurate and up-to-date record of the alumni should be kept by each chapter, we do not think it advisable to include an alumni classification.

May we suggest that each chapter make a determined effort to keep in touch with the alumni by frequent invitations to visit the chapter meetings and to contribute to the programs.

Mutual benefit to the chapter as well as the alumni members would result if the responsibility is assigned to some official in the chapter. It is with this thought in mind that your committee recommends the addition of alumni recorder to the staff of officers in each chapter.

T. A. Rogers

Chairman of Alumni Committee

### REPORT OF THE POLICY COMMITTEE

These are a few excerpts from the report of the committee:

#### Expansion

(a) Efforts toward expansion should be confined to the liberal arts and the teachers colleges. The establishment of chapters in the professional field is generally not desirable, though not necessarily undesirable.

(b) For the present and the immediate future, efforts for expansion should be restricted to the territory in which the majority of the chapters are now located.

Committeeman Rogers suggests that an agreement should be reached as to what qualifications an institution should have before a chapter of Sigma Zeta can be established. Institutional qualifications at present are not definite.

Committeeman Schreiber says: "I believe that expansion should proceed rather conservatively. Brass-band methods do not appeal to me."

#### Honorary Membership

(1) There should exist some definite reason why a particular individual should be elected to membership by a particular chapter. In general a chapter should elect only former members of its own school.

(2) Election to honorary membership should be governed more by the attainments of the individual after graduation than by the scholastic record before graduation.

#### Chapter Relationship to Science Clubs

The following three plans were submitted to the committee:

(1) The chapter itself may conduct program meetings at which scientific and mathematical papers are read and discussion carried on, thus making the work of a Science Club one of the functions of the chapter.

(2) The chapter may sponsor, or encourage and cooperate with, a Science Club (or Mathematics Club) organized separately.

(3) The chapter may confine itself to the honorary function and the necessary business and social routine connected with this function.

Suggestion (2) was generally favored by the committee.

Members of the committee are Edwin W. Schreiber, T. A. Rogers, and C. J. Stowell.

## Registrants at the Sixteenth Annual

Sigma Zeta Conclave, Otterbein  
College, Westerville, Ohio,

April 17-19, 1941

**ALPHA CHAPTER**  
Shurtleff College, Alton, Illinois

**Student:**  
H. Barnard Harms      Marilyn D. Stanton  
Herbert H. Etter      Betty Emans  
Nelson B. Russell  
**Faculty:**  
R. E. Guerrant      J. L. Glathart

**BETA CHAPTER**  
McKendree College, Lebanon, Illinois

**Faculty:**  
S. M. McClure      Herbert D. Gould

**ZETA CHAPTER**  
Central State Teachers College,  
Stevens Point, Wisconsin

**Student:**  
Harry Sheski      Merville L. Meverden  
Gerald Thusing      Grace Winarski  
Robert E. Burkman      Helen Johnson  
Floyd E. Nixon      Marie Anne Eisenhammer  
**Faculty:**  
Gilbert W. Faust

**KAPPA CHAPTER**  
Western Illinois State Teachers  
College, Macomb, Illinois

**Student:**  
Berniece Blank      Lois Shriver  
Glenadine Gibb      Josephine Griffin  
Dorothy Eller      Charles Vandiver Banks  
Willard Vail      Willard Glade Warring-  
Francis Scott      ton  
**Faculty:**  
W. H. Eller      Mary A. Bennett

**LAMBDA CHAPTER**  
Mansfield State Teachers College,  
Mansfield, Pennsylvania

**Student:**  
Le Roy Kilbourne

**NU CHAPTER**

Northern Illinois State Teachers Col-  
lege, DeKalb, Illinois

**Student:**  
Jean Hughes      Ralph Hallen  
Jean Madson      Bruce Churchill  
Robert A. Nelson      Herbert Jenks  
**Faculty:**  
H. W. Gould      D. L. Eaton

**XI CHAPTER**

Ball State Teachers College,  
Muncie, Indiana

**Student:**  
Donna Belle Risk      Olive Leskow  
Alice Marie Clark      Betty Harroff  
Virginia L. Garst      Gene Richards  
**Faculty:**  
Floy Hurlbut      Donald E. Miller  
P. D. Edwards

**OMICRON CHAPTER**

Wilson Teachers College,  
Washington, D. C.

**Student:**  
Marshall C. Gardner

**EPSILON CHAPTER**

Otterbein College, Westerville, Ohio

**Student Active:**  
Robert E. Waites      Richard Wagner  
Howard Elliott      Florence A. Emert  
John Paul Miller      Robert Norris  
Stanley W. Taylor      Dwight R. Spessard  
Howard W. Altman      Andrew Woolley  
Leslie Meckstroth      Arthur Secrest  
William James      Frank M. VanSickle  
Tom Gardner      Jean Mayne  
Dorothy Arkill

**Associate:**  
Henrietta Mayne      Beverly Loesch  
Giles Nelson      Betty Orr  
Weyland Bale      Geneva Barrick  
Helyn Boyer      Miriam Struble  
Marion Dick      Robert Kissling  
**Faculty:**  
James H. McCloy      Lyle J. Michael  
F. A. Hanawalt      A. J. Esselstyn  
E. W. E. Schear      Charles W. Botts

**COMMITTEES, 1941-42****ALUMNI:**

T. A. Rogers, Chairman, Zeta Chapter, Central State Teachers College, Stevens Point, Wisconsin  
E. E. List, Alpha Chapter, Shurtleff College, Alton, Illinois  
H. W. Olson, Omicron Chapter, Wilson Teachers College, Washington, D. C.

**POLICY:**

C. J. Stowell, Chairman, Beta Chapter, McKendree College, Lebanon, Illinois  
E. W. Schreiber, Kappa Chapter, Western Illinois State Teachers College, Macomb, Illinois  
T. A. Rogers, Zeta Chapter, Central State Teachers College, Stevens Point, Wisconsin

**RITUAL:**

E. E. List, Chairman, Alpha Chapter, Shurtleff College, Alton, Illinois  
S. M. McClure, Beta Chapter, McKendree College, Lebanon, Illinois  
J. L. Glathart, Alpha Chapter, Shurtleff College, Alton, Illinois

**EXPANSION AND PROMOTION:**

D. E. Miller, Chairman, Xi Chapter, Ball State Teachers College, Muncie, Indiana  
P. D. Edwards, Xi Chapter, Ball State Teachers College, Muncie, Indiana  
T. A. Rogers, Zeta Chapter, Central State Teachers College, Stevens Point, Wisconsin

48 out of 49