



THE SIGMA ZETAN

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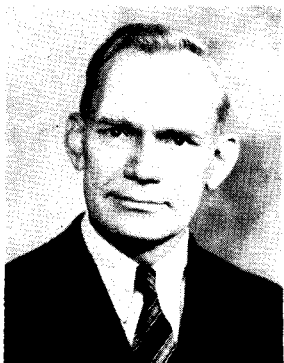
CENTRAL STATE TEACHERS COLLEGE
Stevens Point, Wisconsin

THE SIGMA ZETAN

Official organ of Sigma Zeta, a National Honorary Science Society

National Officers

- National President W. H. Eller, Kappa Chapter
- National Vice-president D. E. Miller, Xi Chapter
- National Recorder-Treasurer G. W. Faust, Zeta Chapter
- National Editor A. S. Lyness, Zeta Chapter
- Past National President J. L. Glathart, Alpha Chapter



MEET
YOUR
EDITOR

The editor's office is just above the entrance shown on the front cover of this issue. Here the SIGMA ZETAN originates twice each year.

THE BEAUTY OF TRUTH

An Editorial

While attending a teacher's institute many years ago we heard a man, who had been regularly employed as a mathematics instructor in a high school for a considerable time, say that he loved to teach mathematics because the subject involves the use of so many equations, which are statements of equality and as such are statements of truth and, to quote his own words -- "there is nothing else in the world so beautiful as truth."

In a strict sense it might be said that all beauty is truth and all truth is beauty because there is very little beauty in anything that is false, such as false faces, false teeth, false hair, or in anything else that is unnatural or unreal. Nature is generally beautiful because it is real and is in itself a manifestation of the truth.

When a court pledges a witness on oath to tell the whole truth and nothing but the truth there is an implication in the statement which would classify some expressions as half truths or partial truths. Apparently justice, which is right, cannot be administered unless the whole truth is spoken. This reasoning would seem to put partial truths into the category of wrongs, which are opposed to justice and right. Since right and wrong in an ethical sense are never absolute but relative than truth and falsehood, if synonymous with right and wrong, is also relative. Truth, then, may be said to be beautiful to the same degree that goodness is beautiful. Since the judge wants to hear the truth, for him, at least, to hear the truth is beautiful.

For the mathematician referred to above evidently to think, to write and to speak the truth gave him a sense of satisfaction that may be said to be beautiful or good. It is impossible to overestimate the significance of alleged facts spoken to young children by parents and teachers. It is infinitely more desirable for an adult to modestly admit ignorance of the truth, when assailed by numerous tantalizing questions from a youngster seeking to discover the answers to puzzling situations, than to attempt an answer the truth of which is not definitely known. There is beauty only in the spoken truth in this instance.

Not only is it beautiful to hear the truth and to speak the truth but there is beauty in known truth. The greatest teacher the world has ever known once told His followers that they should seek to be his disciples, "and ye shall know the truth and the truth shall make you free." It is obvious that knowing the truth will free us from doubt and superstition which go hand in hand with ignorance. And historically we know that in the past, and even in the troublous times in which we are living, men will make tremendous sacrifices, to the extent of giving life itself, to secure freedom of speech, freedom of the press, freedom from want, and freedom from fear because freedom is desirable and beautiful. If knowing the truth will make mankind free, every individual will want to know the truth as early in life as possible.

Lastly, there is another aspect of truth which may be said to be beautiful. The scientist finds pleasure in his constant quest for the truth and that joy is enhanced but not culminated when the truth is discovered because the discovery of one truth often leads to the beginning of a search for other truths so that the laboratory research worker delves deeper and deeper into the unknown in his zeal to discover the truth. Do you agree with the European philosopher who once wrote that he believed that the ultimate truth would never be known by man? If that is a correct assumption, we shall want to hear, to think, to speak, to seek, and to discover the truth in all its purity and beauty in order that we may be free forever.

FAUST ON LEAVE

His many friends on the campus of Central State Teachers College, Stevens Point, Wis., were surprised and pleased to see Ens. Gilbert W. Faust about the college during a part of his twelve-day leave, Mar. 11-23 After attendance at Princeton for five months and four and a half months of instruction at the Massachusetts Institute of Technology he has now been assigned to the Brooklyn Navy Yard where his work will involve installation and maintenance of radar equipment. His fellow Sigma Zetans will all join in wishing him abundant success in his work.

THANKS FOR EVERYTHING

In response to requests sent out from the office of the Editor for annual reports to be filed by April 1st, eight were received from the twelve active chapters on, or nearly on time; and because of the generosity of chapter officers in sending accounts of this semester's proceedings we are enabled to publish for the first time in several issues something in the way of CHAPTER NEWS for almost every active chapter. Your cooperation is greatly appreciated. Ed.

The American Sociological Review conducted a poll of the attitude of a thousand high school students about supporting the aged. "If they are crabby, critical, meddling, or jealous busybodies the children are not going to want them in their homes. Children should not take care of parents if it makes for squabbling and turmoil all the time."

A MESSAGE FROM THE NATIONAL PRESIDENT

Macomb, Illinois
April 3, 1945

Once again we are coming to the time of year when, just a few years back, all members of Sigma Zeta were thinking about the annual national meeting and each one was hoping that he might be among the fortunate ones to be sent as delegates. It is unfortunate that probably none of the present active members have had the pleasant and profitable experience of attending one of these meetings. Delegates of past years were unanimous in listing these trips among the high-lights of their college experiences. The lack of these opportunities during the last few years will just have to be chalked up with the relatively few sacrifices we at home are making now. We must try to stimulate our national fraternal unity in other ways until better days come again. The future is far more promising now than it was a year ago.

With events of such magnitude and rapidity as are passing before us each day we really have difficulty in promoting some activities which are worthy of our efforts. Among these we may list our own organization of Sigma Zeta. If confronted with the question, most of us would no doubt confess we should be giving more thought to this cause. It is satisfying, however, to note that nearly all chapters have continued to remain active, even with only a few members, and that they are submitting their annual reports and student papers for publication in the usual manner. These contributions form a most important factor in maintaining our national unity and interest during these lean years. Those members who are largely responsible for these contributions deserve much credit and commendation.

I am pleased at having this opportunity to call attention, also, to the grand work our National Editor is doing for us. He has put out an excellent December number of the Sigma Zetan and is now issuing the spring edition. But this is not all. He is also serving as National Recorder-Treasurer, in the absence of Prof. G. W. Faust, who is with the armed forces. The duties of these two offices constitute a considerable load and they are being well performed. I am sure the National Council and the whole organization join me in expressing thanks and appreciation to Dr. A. S. Lyness.

We're on the way and we're going up. Let us enliven our spirit and enthusiasm in this work to the end that our chapter activities may challenge the best efforts of all members.

W. H. Eller, National President

OUR VICE PRESIDENT WRITES A LETTER

Muncie, Indiana
January 5, 1945

It is unfortunate for us as a national organization that at least another year must pass without a regular national meeting. Of course, this is one of the small sacrifices in a war torn world, but for Sigma Zeta it is a real sacrifice. It is to be hoped that at least one faculty representative from each Chapter can meet with the national officers somewhere, sometime, in 1945. Much could be gained from such a meeting.

While we are unable to compare experiences personally and to strengthen the national organization by means of annual meetings, let every Chapter exert itself to get to the editor a written report of every meeting or experience of the Chapter which might help another Chapter to better its program.

The Sigma Zetan is open for any student papers of merit. Both faculty and student members should work toward student papers worthy of this honor. The

best papers from each Chapter should be sent to the editor. This means some real work, but it is something to which much attention was given at our last annual meeting at Turkey Run. It is more significant during this war period as a means of making Science and Sigma Zeta have more meaning for each of us. Wouldn't it put real vitality into our local and national organizations if every student member put some real effort into a good paper this year? More important still, think how much would be gained by the individual who worked on such a paper even if finally it was not considered good enough for the Sigma Zetan or if there wasn't enough space for it to be printed in full. Let us do something this year about student papers.

It is a blow to Sigma Zeta to lose the services of our enthusiastic and hard working National Recorder Treasurer. However, his country has called him to serve with the armed forces and we know that he will render a fine service wherever he is placed. Let us see to it that those of us who are on the home front render a worthy service to our country in whatever way we can.

Donald E. Miller
National Vice President

In the case of artery injury cigaret smoking increases the pulse beat 36 beats a minute, average blood pressure increase is 19 millimeters of mercury for the systolic and 14 for the diastolic. Changes in heart action increase after smoking two cigarets.

NEWS FROM THE CHAPTERS

ALPHA

Shurtleff, College, Alton, Illinois
President, Ruth Aulabaugh
Vice President, Martha Reid
Secretary, June Poole
Alumni Recorder, Beulah Porter

We wish to take this opportunity to state our opinion of the Sigma Zetan. We certainly appreciate this publication. No society has a better one—few are as good. Congratulations, Mr. Editor, may you continue to publish such beautiful, in every respect, numbers.

We observed in—
January, "National Public Health Nursing Day"

February, "National Social Hygiene Day" (See press notice below.) Both programs were given before the student body in assembly and may be called special events for the society program.

Reorganization this spring has strengthened the chapter and we are ready to go forward next year with vigor.

Yours very sincerely
E. E. List, Faculty Sponsor

SCIENCE SOCIETY OBSERVES SOCIAL HYGIENE DAY

Doctor Norman J. Rose Alton Clinic
Director Talks in Assembly

On February 6, the Sigma Zeta Science Society again observed National Social Hygiene Day with a talk by Dr. Norman J. Rose, Director of the Alton Social Hygiene Clinic.

Our observance of National Social Hygiene Day on Feb. 6 provided an unequalled opportunity to intensify both current activities and long range planning upon which the success of the social hygiene program depends.

Much of this progress has been made because of the urgent wartime need to protect the armed forces, industrial workers, and the young in general from the damaging effects of syphilis and gonorrhoea.

A fundamental consideration in all such activities and planning is that, in the final analysis, it is promiscuity which spreads venereal disease. Army and Navy reports

show that the majority of infections are traceable to "free girls" or pick-ups.

Thus the attack by public health measures, law enforcement and citizen action should be directed against the public casualness toward moral values.

Much of this sex delinquency comes out of home and community conditions disturbed by the war. More trouble is due to failure to provide the instructions and guidance necessary for knowledge and character-strength to withstand the stress of living today. Needed too, are more facilities for wholesome recreation, and other outlets for young energies.

The Community is on the firing line. It is right that the community should take up arms in this battle, for it is here where the conditions exist which favor the spread of venereal disease. The battle must be fought relentlessly, with skill and courage. Our community will have no better program for disease control than the citizens want and are willing to support.

An effective campaign to eradicate venereal diseases and to promote a constructive social hygiene program should include all sectors of her front: medical and public health; law enforcement; welfare and educational activities; character building; moral, social and religious influences. Combined operations are needed. The spearhead must be prevention.

BETA

McKendree College, Lebanon, Illinois

**President, Frank M. Snyder
Recorder-Treasurer, Dean C. J. Stowell**

Dear sir:

We have no new chapter news. No new members have been initiated since those reported last December. We are not trying to do more at present than carry on necessary business. Faculty members are do-

ing double work and all student members are "commuters", who are on the campus only part of the day.

We continue to present the "Wagoner Memorial Cup", a travelling trophy intended to be awarded annually. We send the Sigma Zetan to recent alumni and to members in service as far as possible.

It is characteristic of the fundamental soundness of the society idea that our small chapter retains a high degree of respect on the campus simply by retaining rigidly the honorary feature.

With best wishes,

C. J. Stowell, Recorder-Treasurer
Sincerely yours,

P.S.:—If other chapters are as attenuated as ours in the matter of news, I feel that you would be justified in "passing" the April issue of the paper.

GAMMA

No report.

EPSILON

Otterbein College, Westerville, Ohio

**President, Bob Katase
Recorder-Treasurer, Esther Smoot
Program Chairman, Helen Aydelotte**

On January 17 Bob Katase was elected president to replace Janet Shipley who completed her school work at the end of the first semester. Bob is a senior and a chemistry major. At our February meeting he spoke to us on "Photography".

Professor Hanawalt talked about "Our Conception of Size" on March 7.

The meeting of March 21 featured a showing of the movie "Freedom Rides on Rubber".

A weiner roast and picnic was held on April 4. Star gazing was planned but did not materialize because of rainy weather.

The chapter presented an assembly program for the student body on March 29. A meeting of eminent

scientists in the year 1970 was held with various new inventions and procedures being presented. Marylu Keller, an associate member, was planning chairman.

The blood donor drive sponsored by the chapter ended on April 3 when 35 students visited the Columbus center. It is hoped that various smaller parties may be sent at intervals during the remainder of the school year. Virginia Timblin was chairman of the drive.

On April 18 the annual semi-formal banquet will be held at the Beechwood at Worthington, Ohio. Dr. Harry Topolsky of Columbus, an alumnus of the Epsilon Chapter will be the speaker. The annual award will be presented on this occasion to a senior member chosen by the professor-members.

ZETA

Central State Teachers College, Stevens Point, Wisconsin

**President, Bernadine Peterson
Vice President, Mary Hotvedt
Press Representative, Betty Furstenburg
Program Chairman, Edward Nigbor
Recorder-Treasurer, A. S. Lyness**

Meetings are held regularly the third Wednesday evening of each calendar month.

The program at the February meeting consisted of an illustrated talk by Prof. Charles C. Evans, of the Department of Biology, on the topic "Tropical Diseases and the Organisms That Cause Them." (See paper elsewhere in this issue.)

At the March meeting Dr. John W. Thomson, Jr. of the University of Wisconsin gave an illustrated talk on "Conservation of Wisconsin Wild Flowers". The conservation class of the college was invited to be guests of Sigma Zeta for this lecture.

The April meeting was "Sigma Zeta Night" in the Zeta Chapter. Five active members of the chapter discussed each in turn the following topics:

1. The History of the National Sigma Zeta Society.

2. The History of the Zeta Chapter.

3. The National Constitution of Sigma Zeta and the Constitution of the Zeta Chapter.

4. Some things that we can do.

5. Advantages that may come to the student, to the society, and to the college from the activities of Sigma Zeta.

The May meeting will be a picnic held in one of the local parks at which time the officers for next year will be elected. At the May business meeting an amendment to the local constitution will be voted on to add the office of Historian to the list of chapter officers.

KAPPA

Western Illinois State Teachers College, Macomb, Illinois

**President, Helen Brown
Vice President, Betty Long
Secretary-Treasurer, Jean Fritz
Historian, Dorothy Ann Loring
Editor, Martha Lee**

Interesting meetings held during the past year:

November 16—The History of Sigma Zeta

December 20—A Talk on Anthropology

February 21—A joint Meeting with the Chemistry & Physics Club.

Two faculty members and six active student members have been added to the roll of this chapter during the past year.

MU

State Teachers College, Mankato, Minnesota

**Dr. Leonard A. Ford, Acting Sponsor
Dr. G. M. Wissink, Sponsor on Leave.**

April 5, 1945

Dear sir:

The Sigma Zeta organization here at Mankato has been quite inactive this year due to low membership. Only one person was left over from the previous year.

I am reporting four new members and enclosing \$5.00 initiation fees. Kindly send the appropriate membership certificates.

The best we can do here is to try to keep up interest in the organization until the students return. I am sorry to report no more activity.

Very truly yours,
Leonard A. Ford

NU

No report.

XI

**Ball State Teachers College,
Muncie, Indiana**

**President, Mabel Anderson
Vice President, Harriet Simmons
Secretary, Helen Hunter
Recorder-Treasurer,**

Dr. R. N. McCormick

Two faculty members, nine active student members, and six student associate members have been added to the chapter roll during the past year.

Meetings usually include a panel discussion by physical science and mathematics instructors as to contributions of other fields to the main one taught by that one.

On April 7 a morning trip was made to the FIFTH SERVICE COMMAND LABORATORY at Fort Benjamin Harrison near Indianapolis. Departments visited were: Food Testing; Veterinary; Chemistry; Bacteriology; Serology; Viruses and Entomology. Fifteen went and enjoyed a noon army meal, too. Former Ball State Chemistry Professor Major Roy D. Maxwell is Adjutant. Colonel Holt is Commanding Officer.

PI

**James Millikin University, Decatur,
Illinois**

**President, James Fritz
Secretary, Marjorie Larsen
Treasurer, John Venturi**

Dear Editor:

This year our small chapter has tried to be as active as possible. We started with two old members and

in December initiated five more, one of whom has left for military service already. Our first meetings were mainly for the purpose of organizing, but in December we had a banquet for the new members. We have made this banquet more or less a tradition when each of the new members prepared a paper in the scientific field he is most interested in and gave a short talk on it that night. After each talk there started spontaneously an enthusiastic discussion which we all enjoyed very much. Our new members are—

Elizabeth Hoppe, Blue Mound, Illinois
Marjorie Hortin, Albion, Illinois
Eloise Hurtt, Decatur, Illinois
Lois Sager, Belleville, Illinois
John Venturi, Langleyville, Illinois

Plans are now being made for another meeting at which we hope to have a faculty member talk about Mme. and Eve Curie.

Sincerely,
Marjorie Larsen, Secretary

RHO

**Indiana Central College,
Indianapolis.**

**President, Joseph A. White
Vice-President, William E. Schaffer
Recorder-Treasurer, S. M. McClure
Editor, Bonnie L. Polk**

"SUGGESTIONS" taken from this year's annual report.

When Rho was organized and installed, quite a few of the chapters wired or wrote greetings, etc., all of which made us here at Rho feel good, particularly as we were organized under difficulties. If it were known when a chapter is to be installed, it might be a worthwhile custom to get going.

A more serious suggestion: After the installation given at Rho, we feel that no chapter should be chartered until it has been duly installed by the national officers or their representatives.

In spite of the small number of active members, the Rho chapter at Indiana Central College, Indianapolis,

had a good year in 1944-45. An interested alumni group have done much to keep the organization functioning consistently and it is expected that the alumni will see Rho through the war period in good shape.

After the 1944 Commencement, the chapter was left with little more than a skeleton organization; during the year, however, three student and two alumni members were added. At the end of the current semester, but one senior will be lost by graduation and it is expected that three or four science students will become eligible for membership; accordingly, the prospects seem fair for a somewhat larger chapter next year.

The graduating senior is Bonnie L. Pope, of Westfield, Illinois. Miss Pope was the first student initiate after the local chapter was installed and has served the group as editor of the student papers for the past year. She is a biology major and expects to enter graduate school to prepare for work as a medical technologist.

Lowell H. Good '32 was the first alumni pledged during the year; he was initiated at the mid-summer meeting. G. Don Klopp, also of the class of 1932 was initiated at the recent March meeting. He is a former instructor in biology at Central but is now teaching at the Indianapolis Shortridge high school.

During the past year, eight meetings have been held and two more are scheduled before the close of school. Two of these meetings have been business sessions, two have been held for initiations, and four have been program meetings. Speakers from outside the chapter were provided for two of the programs, student papers were presented at a third, and the fourth was arranged by the alumni to include an industrial movie film and preliminary talk. The year's work will end with two meetings, at one of which officers for the coming summer and school year will be selected.

SIGMA

Our Lady of the Lake College, San Antonio, Texas

**President, Onice Feille
Vice President, Sister Mary
Clarence**

**Secretary, Frances Elaine Wagner
Treasurer, Faye Schuchart**

Activities of the Sigma Chapter

On December 6th and 7th, two of our sponsors, Sister M. Berenice and Sister M. Clarence attended the first state-wide Chemurgic Meeting in Dallas. During our January meeting, Sister Clarence gave us a report on this meeting. Highlights of this meeting, according to our reporter was a paper on Texas Silk Culture, now in operation at Mineral Wells, Texas. An unusual long growing season of the mulberry tree as well as the invention of an electric reeling machine makes the production of Silk in Texas cheaper than that of Japan.

The sweet potato crop with its many possibilities and by products; the peanut and pecan industry; essential oils; cotton products; ramie fiber; forest products; synthetic rubber and a host of other topics filled a most interesting two-day program for 216 Scientists and Industrial leaders from all over the state, according to our reporters.

During the month of February, Sigma Chapter of Sigma Zeta sponsored two interesting attractions: The Polomene Potters and "On the Beam". Mr. and Mrs. J. E. Sawhill or The Polomene Potters, as they prefer to be called, presented a descriptive demonstration on pottery making on February 1. Though they started pottery work as a hobby, the Polomene Potters became so enthusiastic that they went into the business and during the twelve years of giving demonstrations they have toured 43 states. The word "Polomene" comes from an Indian word meaning butterfly which was the Indian symbol for beauty.

On Feb. 19, Mr. Glenn Morris, well-known science lecturer and demon-

strator presented a program entitled "On the Beam". Mr. Morris explained the fundamentals of radio and its application in the field of aviation which calls for quick and clear thinking. Mr. Morris advised the student body to stay "on the beam" if they want to be successful in life and in order to do that they must have technical knowledge and facts, not mere notions.

3) The February meeting took on the form of a social gathering when the members of Sigma Zeta were entertained by the pledges at a wiener roast on the Campus prior to Valentine's Day.

NEWS OF SIGMA ALUMNAE

Alberta Besch, now Mrs. Ray Herbert, is holding a position at Randolph Field, supervising clerical work in the Research Library.

Louise Greer graduated with a major in biology. She was awarded a fellowship from the Kellogg Foundation in Health Education at the University of Michigan where she received her M. A. degree. She is now

Foresters tell us we're cutting our trees faster than they grow. Many of the giant spruce are from 200 to 400 years old. What is the answer? Tree breeders say hybrid trees is the answer. Burbank's fast growing methods proved that cross breeding did wonders for agricultural and horticultural crops. And tree breeding seems to promise hope for the future. In the Northeast, the U. S. Forest Service in 1936 began hybridizing birches, poplars, ashes, maples, and oaks—in ten years time the hybrids were from 40 to 50 ft. tall which represents a diameter growth of about one inch during the four months growing season. Some hybrids grow more rapidly than native timber and the testing of the woods has proven them equal or better in quality to native lumber for paper pulp and chemical uses.

Because many experts believe that modern street noises will be unknown in the cities of the future, records of typical street and sidewalk sounds were recently sealed into the cornerstone of a New York building. Recordings of honking horns, police whistles and other familiar urban noises were made on chromium-plated copper discs, coated with an imperishable tarry compound, and locked in a copper box. Included also were a phonograph and instructions for removing the tarry compound and playing the records.

"Bread, beauty, and brotherhood are the three great needs of man. We shall create a new social order in which everyone who renders honest service shall have these things."—Edwin Markham.

director of Health Education in Charleston, S. C.

Rita Koltes, a chemistry graduate, merited her M.T. in October 1944 at the 8th Service Command Technological Laboratory under Major Pollard. She is now working in the Foods Chemistry Division under Colonel Livesay at Fort Sam Houston.

The San Antonio Water Board has as their water analyst, Peggy Fogarty, chemistry graduate who is at present absent on leave taking a refresher course in water analysis at A.&M. College.

Faye Schuchart, graduate of 1944, is at present receiving her training as a medical technologist at the 8th Service Command Laboratory at Fort Sam Houston.

Clara Ng has a distinction of being the first Chinese student to receive a B.A. degree from Our Lady of the Lake College. At present she is working on her M.D. at Johns Hopkins Medical School and her ambition is to give her services to the poor people of China.

INDUCTION HEATING

A paper presented by William Moulton, a physics major,
Kappa Chapter, Macomb, Illinois

The basic principles and theory of induction heating have long been known, however, it has been only in the past three or four years that applications have become at all common. Even today there are several difficulties to be overcome before induction heating will be as commonly used in industry as other methods.

Methods of induction heating may be divided into two classes; (1) heating of conductors by means of a magnetic field and (2) heating of non-conductors by means of an electrostatic field.

There are several distinct advantages to the induction heating of certain parts or pieces over other methods. Most of these advantages result from the fact that heat is developed directly within the piece itself, thus there is no time lag between the application of heat and the actual rise in temperature. Thus induction heating gives a rapid rate of heating, no physical contact between the piece and the coil are necessary, heating may be confined to only a certain part of the piece where heating is necessary, and heating may be stopped in an instant by merely breaking the electrical circuit. Difficulties include high initial cost of powerful RF oscillators, and transmission difficulties.

The induction heating of magnetic materials consists of placing the piece in a rapidly changing magnetic field. This sets up electrical currents within the piece, and losses due to the resistance of the piece results in the heating of the piece. The method used to produce the rapidly changing field, and to link it to the work, consists of an RF oscillator, and power amplifier stages, which is merely a variation of a transmitter. This RF current is passed through a coil, and the piece placed inside the coil. From Faraday's law of induction it may be seen that the voltage induced depends upon the frequency and the flux linking the coil and the work.

The frequency is an important consideration in the design of an induction heater. It is obvious that as high a frequency as possible should be used. However, as the frequency increases, the induced currents tend to become less and less at the center of the piece until finally this effect offsets the advantage gained by increasing the frequency. It can be seen from this that the smaller the work the higher the frequency that may be used to an advantage. The frequencies used are on the order of 175 KC but this may vary LOOKC in either direction depending upon the size, permeability, and resistance of the piece to be heated.

Another consideration is the fact that at a certain temperature the piece will show no detectable ferro-magnetism, and the permeability will become unity. Heating beyond this point will thus necessitate a different approach.

Perhaps the first application induction heating was the heating of the elements of vacuum tubes which had already been evacuated, the purpose being to drive the gas from the elements so that the tube could be still further evacuated.

An application of magnetic field induction heating is the production of tin plating. A unit in operation in a steel mill is an 8600kw, 200kc generator. Another application now in use is the heating of shell casing and bombs before spinning. Other applications include the hardening of crankshaft bearings in four seconds, soldering by wrapping a length of solder around the joint to be soldered and heating several joints at once. Many other applications of magnetic flux induction heating are now in use, and many other uses will probably

be found for this type of heating as the equipment becomes cheaper and more plentiful. In some cases, the use of induction heating decreases the cost of manufacture, while in some others the quality of the product is increased.

Electrostatic induction heating depends upon the fact that when a poor conductor or insulator is placed in a rapidly changing electrostatic field, the power loss in the dielectric (the object to be heated in this case) causes it to become hot. The method used involves the same type of RF generator as in the case of the magnetic flux inductance heater, except that the RF power is fed into a large capacitor usually consisting of two metal plates, and the object to be heated is placed between these plates. The frequency must of course be much higher than in magnetic inductance heating, usually ranging between 5Mc. and 50 Mc., depending upon the size, shape, and dielectric constant of the piece to be heated.

Electrostatic induction heating appeared first as a demonstration to arouse the public interest in products in order to sell them, such as cooking hot dogs and popping corn "without heat".

Perhaps the field where electrostatic induction heating is used more than in any other field is the field of plastics. Preheating plastics before they are molded allows them to be molded at greatly reduced pressures, and reduces the time of heating to a minute or so, since the heat is produced inside the plastic itself. The plastic to be molded is placed between the plates of the capacitor. The heating must be very rapid to prevent polymerization from taking place before the mold can be closed.

The power is usually fed to the mold by means of transmission lines. The terminal end must be tuned by means of variable inductors to the frequency of the oscillator. The inductance must be very small since the capacitance is large. Both series and parallel are used. The dielectric constant of the material changes greatly during the heating. This in turn causes the capacitance to change, thus requiring returning of the circuit or a great loss in efficiency. To overcome this difficulty an electric motor is used to increase or to decrease the distance between the plates. This motor is automatically controlled, and the circuit is kept tuned throughout the heating cycle. Also this takes care of inconsistencies in the material, since one batch may differ from another as to its dielectric constant by as much as 10%.

The RF is usually fed to the heating unit by means of a transmission line from the oscillator. It would be impractical to have the RF generator installed in the molding plant itself, since the electronic equipment would take up a great deal of space, and the high temperatures, excessive dirt and dust, steam and water leaks, and the presence of untrained labor all create an unfavorable environment for electronic equipment. The transmission lines used are much the same as coaxial cable on a much larger scale. The center conductor usually consists of tubing of small diameter, while the outside conductor consists of a six or eight inch diameter cylinder separated from the inner conductor by a spacer. The reason for such wide separation of the conductors is to prevent flashovers, as high potentials are needed to produce the required power.

Another application of electrostatic induction heating to the plastic field is the "electronic sewing machine", which fastens together thin sheets of plastic in the production of such articles as tobacco pouches, raincoats, and food coverings. The technique consists of drawing the edges of the material between two plates to which an RF source has been connected. The materials are heated to their softening temperature and pressure applied, thus forming a bond.

This method of forming seams in plastics has many advantages over either sewing or by using hot plates to form a bond. It is cheap, requiring only about ten watts input to bond five feet of material per minute to form an eight

inch seam. The seam is water tight, and as strong or stronger than other types of bonds, since only the inner surfaces are heated to the temperature where they become soft.

The use of laminated wooden spars for aircraft has become common in the aircraft industry due to the scarcity of aluminum and other metals. RF heating has an application here too. The glue can be made to dry four or five times as fast as when it is allowed to set at room temperatures. Also RF heating permits the use of resin glues which set by pressure and heat rather than by the evaporation as animal glues. This type of glue produces a moisture resistant joint. The capacitor plates are so constructed that pressure may be applied to the work while heating is taking place. Spars manufactured by this method will compare favorably with metal spars of the same type.

Dehydration of foods by induction heating has recently been investigated. Tests were made on samples that had been compressed under a pressure of 500 pounds per square inch. The compressed foods were dehydrated by RF heating while in a chamber evacuated to 29 inches of mercury. A frequency of about 29Mc. was used, and the food raised to a temperature of 120 to 140 degrees. It was found that compressed food can be dehydrated to within 1% water content in one tenth the time necessary when conventional methods are used. The electrical energy required is low, and thus the cost is low. The test demonstrated that the electronic dehydration of foods is decidedly promising for commercial use.

We have seen the essential principles of induction heating, and a few of the applications. Other applications are being recognized and developed constantly. Electronic heating apparatus has become more and more common in the past few years and even months. In the March 1943 issue of "Electronics" it was stated that the total power used for RF heating was in the order of 10,000 KW, while the total installed broadcast power was about 4000KW.

Induction heating cannot perhaps fulfill all of the hopes of the public, and of the many who attribute miraculous powers to induction heating. However there are untold numbers of situations where RF heating may be applied where it would be extremely difficult or impractical to use conventional heating methods. And in many cases electronic heating may replace conventional methods as being more efficient and faster. The field of induction heating is probably one of the most rapidly growing fields in electronics at the present time.

Take care of your head * * * at least one out of every 8 men from a group of 4822 consecutive inductees at two naval stations had received head injuries. Most injuries are caused by falls, being hit by falling objects, running into doors, tables and chairs, and other people. Many result from blows in sports. Families pay too little attention to head injuries when they happen.

"Touch not"—at least Science Service says slow up on the sugar while you have time. Diabetes will outrank tuberculars in 1950. This is true according to a report of the Metropolitan Life Insurance Co. Modern treatments are controls, but—who wants to be a diabetic? Eat less sugar.

The American Medical Association has reported recently the discovery of a swiftly relieving treatment for arthritis. It is the new drug, neostigmine, also known as prostigmine. Out of 19 patients with related conditions there were 13 favorable responses.

THE STORY OF D. D. T.

A paper read by Mary Sartori at the March meeting of the Sigma Chapter.

Our Lady of the Lake College, San Antonio, Texas

D.D.T., which is short for dichloro-diphenyl trichlorethane, is so far the outstanding new life-saving chemical of the war.

It has prevented typhus epidemics by wiping out the lice that carry this disease. It helped control such an epidemic by preventing further spread of the disease in Naples in 1943. When a new typhus case was found, it was isolated and a protective sprinkling of D.D.T. louse powder was used to cut off infection at the source. D.D.T., also, has eliminated the menace of insects upon tropic islands where disease carried by insects has been more deadly and damaging than Japs. For the first time in medical history an entire island has been sprayed with D.D.T. Troops making D-Day landings in the future may find the beachheads free of disease-bearing insects due to the pre-landing D.D.T. spraying of the area from the air.

Before the war, an insecticide was, to the average layman, something to spray or dust around the house to rid the house of mosquitoes, flies, or roaches. Then came the war and the need for more food which drove many people here at home to victory gardening. This placed them in contact with many crop pests which had to be killed to save the food that was raised. War also brought typhus fever and malaria to our men overseas; the battle against disease had to be won before the battles to win the war could be fought.

This new weapon against our insect foes was D.D.T. It was first developed in 1874 by a young German chemistry student; he developed it as a cook might develop a new recipe, and apparently had no idea that it had any insect-killing powers.

D.D.T. was buried in a German Chemistry Society report until a few years ago when Paul Muller, a scientist for a chemistry manufacturing firm in Switzerland, discovered its properties as an insect killer. Even then, it was a crop pest and not human disease that brought D.D.T. out of obscurity. In 1939, it saved the Swiss potato crop from possible devastation by the Colorado potato beetle.

D.D.T. is used as a body-dusting powder and as an emulsion to impregnate clothing in fighting lice and typhus fever. It is active not only against lice and agricultural pests, but also against mosquito larvae, fleas, moths, roaches, bedbugs, and silverfish. D.D.T. will not kill all the harmful insect pests and still in spraying large areas many beneficial insects which are allies to man against the destructive species will be killed. Also, entirely satisfactory mixtures and dosages of the insecticide have not been developed nor the methods and timing of application for many possible uses. D.D.T. is injurious to squash, corn, tomatoes and is toxic to animal life when taken internally in large quantities. It is more poisonous to cold-blooded animals, such as fish and frogs, than to mammals.

The cost of D.D.T. has been reduced 40 percent since July 1944 by the DuPont Company. When scarce, D.D.T. was required so urgently a year ago for typhus control in Italy that the cost was \$1.60 per pound. Commercial production brought the cost down to \$1 and January 1, 1945 the cost to the Army and Navy was reduced to 60 cents per pound. Process improvements combined with the production increase has permitted the price reductions.

The strongest living thing, in proportion to its weight, is the beetle, which can carry a burden 850 times heavier than itself. If a man possessed proportionate strength, he could carry a load weighing 70 tons.

TROPICAL DISEASES IN THE AMERICAS

(Prof. C. C. Evans, Zeta Chapter, Stevens Point, Wisconsin.)

Department of Biology

Believing that during and after the present wartime emergency a knowledge of this highly specialized subject may become of great importance this article is submitted. Consideration of tropical diseases in the Americas has been given in medical schools and journals, and an occasional article is furnished the layman and general public. Circulars and pamphlets on certain tropical diseases have long been available to the public through publications of the United States public Health Service and other Federal agencies, but most of such publications are written in language which only the medical technician or doctor of medicine can understand.

Few of our medical students trained in the schools of the northern states have had sufficient knowledge of tropical diseases to accurately diagnose, in past years, the less common of such diseases, and in our biology courses most of these diseases are rarely given the emphasis they have deserved, either through lack of general interest, or ignorance of facts concerning them.

With the return of tens of thousands of our military forces from tropical and sub-tropical areas, now and later, and with the tourists of the future who will visit some of those countries or areas where such diseases are relatively common, there will be found some infected with such diseases, many probably carrying infective larvae, or other agents of such diseases in their tissues, and all constituting causes for grave concern.

The present world conflict, with tremendous concentrations of humanity and health hazards of polluted battlefields, water-supplies and strange countries where unfamiliar diseases are a constant menace, has resulted in exposure of both military and civilian personnel to a considerable variety of infections. It is not beyond the realm of possibility that diseases heretofore uncommon on our continent may be encountered with increasing frequency.

In order to furnish to the readers of this magazine some helpful information the diseases herein considered are: blackwater fever, amebic and bacillary dysenteries, echinococcus disease, filariasis, kala azar, onchocerciasis, oryza fever, pinta, plague, rat-bite fever (sodoku), relapsing fever, schistosomiasis and yaws.

Blackwater Fever

The cause of blackwater fever has not been conclusively demonstrated but it seems to follow malarial infections, and is characterized by severe anemia, sometimes fatal.

This disease is very common in Brazil and tropical South and Central America and the West Indies. In the United States in Louisiana, Texas, Alabama, Mississippi, Arkansas, Georgia, Florida and South Carolina it is found in late summer and the fall. Since this disease is closely associated with malarial infection, effective mosquito and malarial control may reduce the incidence of blackwater fever.

Amebic Dysentery

Amebiasis is a disease due to invasion of certain tissues particularly those of the intestinal tract, by the protozoan-*Endameba histolytica*, with dysentery a prominent feature. A chronic form of this disease may persist for many years, but if the organisms invade other tissues of the human body, serious and fatal complications may result.

This disease is found all over the world, in the tropical and sub-tropical areas of America, Mexico and the West Indies.

In 1933 there were 1400 cases in the Chicago epidemic, with infection traced directly or indirectly to unsanitary plumbing systems in two hotels. Contaminated food and water supplies, the droppings of flies and cockroaches, rats and other animals may transmit this disease. In the tropics greatest incidence to amebic dysentery occurs during the rainy season, when there is greater likelihood of contaminated water supplies.

Bacillary Dysentery

Bacillary dysentery, an acute infectious disease, is usually of the Shiga type, invading the mucous membrane of the large intestine and giving rise to production of toxins responsible for collapse, fever, often delirium, ulceration of the colon and other serious complications. It may occur anywhere in the world, but is more virulent and frequent in tropical regions.

It notoriously follows in the wake of armies, taking a surprising toll of life. During World War I there were 7500 deaths from dysentery in the German army. Like typhoid, bacillary dysentery is limited by sanitary more than geographical conditions.

Filariasis (Bancrofti)

Generally, the term filariasis implies infection with the species of parasitic nematodes of the species *Wuchereria bancrofti*, important because of its very wide distribution.

The disease has an incubation period of about a year before microfilarias appear in the peripheral blood, and symptoms of elephantiasis and swellings of regional lymph nodes occur.

Wuchereria bancrofti has a wide distribution in warm countries with cases in Washington, D. C., and other parts of the United States, and all through the West Indies and South America. The proven hosts of *W. Bancrofti* include thirty-two species of mosquitoes such as *Culex fatigans*, *C. pipiens*, *Aedes variegatus*, *Anopheles rossi*, and *A. costalis*. Other appropriate intermediate hosts no doubt exist.

Among military forces returning from the south Pacific areas there are already many cases of filariasis, their cure being a matter of considerable concern to army and navy medical officers.

Kala Azar—"Black Sickness"

The incubation period of kala azar is uncertain and irregular between six weeks and four months, but the disease is characterized by fever, often very erratic, and a dusky or dark color of the skin in commonly chronic cases, the term kala-azar meaning black-sickness. There is anemia in all cases, increased activity of melanoblasts, and marked diminution in white corpuscles as is evidenced by the ratio of 1:1000 to 1:1500 in kala azar, as compared with the normal 1:666 to 1:750.

Occasionally imported cases are found in the United States, but since both infected persons and sand-flies may be transported into the United States, particularly since the air-plane has become such a common means of travel, undoubtedly the incidence of this disease will rise in tropical and sub-tropical areas. Sandflies such as *Phlebotomous argentipes*, biting flies of the genus *Stomoxys* and bed-bugs have long been under suspicion as transmitters and factors in spreading kala-azar. Mice, squirrels and dogs may be infected, as well as mankind.

Onchocerciasis and Oroya fever

Insidiously a nematode, *Onchocerca volvulus*, may be transmitted by several species of small black gnats of the genus *Simulium*, to mankind, in tropical and sub-tropical areas in the Western Hemisphere.

With the opening of transcontinental highways into Mexico and Central America, and their increasingly popular use by tourists from our States, tourists who know little or nothing about most of the tropical diseases, infection with such parasites as *Onchocerca* may be relatively common after this war.

Since little work has been done in studying, classifying, and determining all the relationships of our smaller flies and gnats to the transmission of most of these tropical diseases, very considerable potential dangers exist from them, and the field is wide open for young biologists desiring work in this field.

Oroya fever is endemic in tropical South and Central America, being transmitted to mankind by sandflies (*Phlebotomous noguchi*) which may have bitten human carriers, dogs, and other animals.

Insect repellents and sanitary precautions may help, but sandflies can penetrate screening of 18 mesh, and there are other possibilities of infection.

Pinta

Pinta is a skin disease commonly infecting exposed surfaces of the body; in some characteristics similar to syphilis, with the Wassermann test positive in almost all cases, and clinical stages not unlike those of syphilis. It is most prevalent in Mexico, with many cases in Guerrero province, but it occurs in the West Indies, in Central and South America, especially in the damp, lower areas.

Pinta is probably transmitted by the bite of some insect such as the *Simulium* gnats, and, like syphilis, contact with infective sores should be avoided.

Plague

Following the introduction of plague into California from the Orient in 1900 a definite relationship between animal infection and human plague was established in 1908 by the U. S. Public Health Service and has since caused great concern lest this disease, which is so devastating as to paralyze all forms of human activity once it gets started, might get a hold upon our population.

Plague constitutes a potential threat in every part of the civilized world, active foci existing in Washington, Oregon, California, Idaho, Nevada, Montana, Wyoming, Utah, Arizona, and New Mexico, particularly among the rodent population of these states. Plague is essentially a disease of rodents such as house-rats and mice, ground squirrels and rabbits, and is transmitted to mankind through fleas of many species, including the human flea, *Pulex irritans*, and possibly the bed-bug (*Cimex*). The rat-flea, *Xenopsylla cheopis*, may transmit the infection from rat to rat, rat to man, or man to man.

Great precautions should be taken to prevent the transportation of rats from place to place by all means of transportation in or on which rats may travel about, and this will sooner or later involve much more intense campaigns to rid our cities of their rat populations, which have been increasing in alarming numbers.

Early diagnosis of plague is of the greatest importance for prompt isolation of the case, and antiserum is useful in the early stages of the disease, rarely later.

While human infection is usually through bites of fleas from rats, cases have been caused by inoculation of the plague bacillus into skin surfaces, by contact with infected material; and pneumonic plague may be spread by droplet infection, or contaminated dust.

Rat-bite fever (Sodoku)

While few persons in normal times or civilized areas are bitten by rats, yet other animals, such as the cat, may be involved in transmitting the acutely infectious rat-bite fever. Rat-bite fever has been caused by a spirillum as well as by a streptobacillus, with no evidence that fleas, ticks or other insect vectors, or excreta of man or animals will transmit the disease to man. The transmission of the organisms by another animal does not necessarily imply that such animal is infected, since the organisms may be in or about the mouth, or on the paws of cats or dogs which have contacted infected rodents.

Rat-bite fever has been reported from all over the world, more prevalent in Japan than in other countries, although 125 cases have been reported in the United States, with Massachusetts, Illinois, Ohio, Missouri, New York, Kentucky reporting most cases in recent years.

Relapsing fever

Two varieties of relapsing fever, one borne by lice, the other by ticks, are similar in clinical features, the tick-borne being less severe than the louse-borne. The infective organisms are spirochetes with somewhat differing names in various parts of the world. Louse-borne relapsing fever is rare in civilized countries, in normal times, but war's destruction often makes people live, at least temporarily, in filthy places and with few means for keeping clean, hence this disease is extremely prevalent among people in combat zones.

The tick-transmitted variety is found in Canada, the United States and Mexico, and is recognized as being in at least thirteen of the Western states—Washington, Oregon, California, Montana, Idaho, Nevada, Arizona, Utah, Colorado, New Mexico, Kansas, Oklahoma, and Texas. In recent years 172 cases have been reported in Texas.

Crushing the lice upon the skin is apparently the commonest way in which infective organisms enter the skin, and in some similar manner infective material from ticks may get into the skin, since these infective organisms, the Borrelias, have great penetrating powers.

Like most tropical diseases yaws has other names more or less peculiar to the areas where the disease is found, but its characteristic symptoms serve to distinguish it from other diseases. It is a contagious tropical disease caused by *Treponema pertennue*, with some vague relation to syphilis; it is not a venereal disease.

It is characterized by raised sores, with stages somewhat like those of syphilis.

This disease encircles the globe between the tropics of Cancer and Capricorn chiefly in warm, humid regions. It is prevalent in the West Indies and Central America, being transmitted readily from person to person by direct contact or through infective material carried by flies and gnats. Most cases occur in children, and adults in areas where the disease is common acquire immunity through having the disease in childhood. Since children in tropical countries usually go about naked, and have a variety of sores and abrasions of the skin, they are very likely to become infected through the bite of a very small fly, *Hippelates pallipes*, a voracious feeder. The wearing of clothes, and use of soap and water cleanliness, help prevent infection with yaws.

Conclusions

1. The general public, as well as those entering or already in the medical profession, should feel obligated to gain at least a useful working knowledge of some of these diseases which may get into our midst before we are really conscious of their dangerous nature.

2. While some of the diseases named are perhaps limited to the more tropical areas largely because of the limits of their insect vectors, yet the small amount of study thus far given to causative factors has not revealed all the dangers which might exist in other regions, and the modern types of transportation have brought some of these factors right to our doors, so-to-speak.

3. War-time conditions have always increased the prevalence of some of these diseases; with the tremendous numbers of our military forces flung around the world, and their exposure to conditions against which they can be only inadequately warned, an increase in cases of these diseases is certain, and their appearance sooner or later in our midst is assured.

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The odor of green coffee from the miles and miles of warehouses and plantations of Santos, Brazil, may be detected aboard ship more than a hundred miles at sea, long before land is raised.

1000 different chemicals are used in the making of a tank and more than 2000 in building a battleship.

Chemical & Engineering News.

Moving by rail an infantry division of 15,000 men and their equipment requires 256 passenger cars, 82 baggage cars and 900 freight cars.

The persistently recurring stories concerning sea serpents probably refer to gigantic eels, which are sometimes eight feet thick and 60 feet long.

Alexander Woollcott said, "To the actor on the stage, the tiniest whisper in the auditorium is as audible as a pistol shot."

