
The Duodecimal Bulletin

January - March, 1945

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THE DUODECIMAL SOCIETY

20 CARLTON PLACE

STATEN ISLAND 4, N. Y.

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THE DUODECIMAL SOCIETY OF AMERICA

20 CARLTON PLACE STATEN ISLAND 4, N. Y.

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The Duodecimal Bulletin is the official publication of the Duodecimal Society of America, Inc., 20 Carlton Place, Staten Island 4, New York. George S. Terry, Chairman of the Board of Governors. F. Emerson Andrews, President. F. Howard Seely, Vice President. Ralph H. Beard, Editor.

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The Duodecimal Bulletin

NEW YEAR GREETING

Dear Duodecimalians:

1 January 1941

On this New Year's Day it seems appropriate that I should send special greetings.

Whether this year or any near year our newborn Society will become large in numbers, I do not know. Whether it was courage or mere rashness which led us to launch our venture in the middle of a desperate war, only the long future will decide. But when I see the long continuing enthusiasm of our first small group, and read the highly interesting notes of some of our newer members, I am much encouraged. No one can measure the power of an idea, or be sure when its hour has come.

So, - to you all, - a New Year with as much good fortune as you can stand, and the will and the skill to follow this new trail to fresh discoveries.

Sincerely,

F. Emerson Andrews.

SALUTATION

We extend to you our warmest greetings, and invite all who are interested in duodecimals to make themselves at home in these pages.

We are scattered people, - not grouped. We are few in number in any one community, and there are not many who speak our language. But in these pages we can find the congenial company of those interested in the same ideas. We can explore the thoughts of our friends, and express our approval or disapproval of them. We can find the reaction of others to ideas of our own.

The area and topography of the almost virgin field of these ideas is still being explored. This is the pioneer stage. And we are forming and modifying, by our discussions and the thought drawn from them, the conventions of the still plastic duodecimal system.

For, other than the general application of the duodecimal base, the dozenal system is yet undefined. It is conceivable that it may not be. Progressive acceptance into common usage is likely to be the determining factor.

True, we have accepted certain terms and practices for common use in order to avoid confusion, and that we may readily understand the ideas expressed. For ten, eleven, and twelve, we use *X* (dek), *E* (el), and *IO* (do), and the congruent nomenclature. And we use figures in italics to identify duodecimals. This agrees with the Principle of Least Change, and is well understood by all of us. But these acceptances do not confer establishment nor exclusive recognition.

For instance, it is important to exclude any possible confusion between duodecimals and decimals. Naturally they will have to be used concurrently for many years. So, some think that entirely different symbols and terms should be used for all duodecimal numbers. This is the Principle of Separate Identity. It would be folly to attempt at this time to determine the areas of application of these somewhat opposed principles.

Just now our interest lies in discovering situations and problems suited to the advantageous application of duodecimals; cases where duodecimals may accomplish efficiencies not otherwise attainable; cases such as the calculation of stowage volumes for ship cargoes has proved to be. In applying duodecimals to these situations, special terms and usages may be desirable. Certainly, then, they should be used. It is the actual practice that will determine any definition.

We hope you will report your new ideas to us. We hope to present in these pages every proposal deserving general consideration. If they are of value to you, they will be of value to others. They will adopt them into their own practice and apply them to their own dozenal operations. This is the path of progress we seek to follow.

Let us assure you of our eager consideration of your papers, and our willingness to present them to our readers. This is your forum and we want you to use it.

* * * * *

INCORPORATION OF THE SOCIETY

Originally, the Duodecimal Society of America was an informal organization of a group of duodecimal enthusiasts who kept each other advised of developments by a general exchange of carbon copies of all correspondence. As members were added to the Society, this method became awkward. In addition, the growing public interest in duodecimals emphasized the need for specific delegation of responsibilities and organization on functional lines.

At a meeting of the Executive Committee on 5 April 1160 it was decided that the Society should be formally incorporated under the laws of the State of New York. A constitution was submitted for the approval of the members, and incorporation was finally effected as of 18 July 1160. The following officers

and members of the Board of Governors were elected:

- | | |
|---|---|
| Chairman of the Board | George S. Terry,
507 Main St., Hingham, Mass. |
| President | F. Emerson Andrews,
34 Oak St., Tenafly, N.J. |
| Vice President | F. Howard Seely, 690 Market St.,
San Francisco 4, Calif. |
| Secretary and Treasurer | Ralph H. Beard, 20 Carlton Pl.,
Staten Island 4, N.Y. |
| The Board of Governors to consist of the foregoing, and:
F. Morton Smith,
50 State St., Boston, Mass. | |

President Andrews announced the appointment of the following committee chairmen:

- | | |
|------------------------------------|-----------------|
| Committee on Member Qualification, | F. Howard Seely |
| Publicity | Ralph H. Beard |
| Finance | George S. Terry |
| Awards | Ralph H. Beard |

Because our members are scattered from coast to coast, and attendance at meetings would be both difficult and costly, provision was made for the holding of meetings by correspondence, whenever this is found desirable.

J O H N B E N B O W

The Duodecimal Society lost a good friend by the death of John Glen Benbow on February 21st, 1944 at the age of 59. He was head of the manufacturing department of Longmans, Green and Company, and his interest in duodecimals arose from his association with George S. Terry in the publication of the "Duodecimal Arithmetic".

Mr. Benbow was born in Madison, Iowa, and was a graduate of Phillips Andover, and Harvard. Besides his professional recognition as a typographical expert, he enjoyed an enviable reputation as a scholar in the Greek and Latin classics, and as a collector of rare books. Several years ago he donated to Phillips Andover a number of original editions in Latin, from some of the early European presses, which he had collected here and abroad.

He will be long remembered for his gentle modesty, his delicate courtesy, and his distinguished scholarship.

F. Morton Smith recalls this amusing incident from his long friendship with John Benbow. He writes:

"I first knew John at Harvard. We belonged to the same Club, and lived directly across the Yard from each other. Though we did not team about together, I saw him frequently at the Club, and always admired him. He had a keen mind, and a lively interest in literature, writing, and the art of printing. New developments in science always intrigued him.

"Our meetings after graduation were infrequent. He went into publishing for a while, and then into a family seed business. But he soon returned to his chosen profession of book printing.

"When my friend George Terry completed his tremendous work on the mathematical tables for the duodecimal system, he was faced with the difficult problem of finding a publisher who would consider them. After many discussions, we walked into the Longmans Green offices, one day, by appointment. And there was John, a little older, a little grayer, but with the same keen twinkle in his eye.

"Yes, he had read Andrews' duodecimal article in the Atlantic. It had intrigued him, though he was not a mathematician. His ardent interest was stimulating, but it did not confuse his clear thinking, as we talked about the book. He would let Terry know if Longmans would publish it. And Longmans did."

ENDOWMENT

A long road lies ahead of the advocates of dozenal counting. The medieval world required nearly 500 years to make the change from the archaic Roman numerals to the Arabic notation, with its miraculous 0. The modern world can be expected to move only a little less slowly.

Who can foresee what vicissitudes of fortune may confront us? The work of the Society in educating the public in the use and application of the 12-base must be assured of continuity regardless of the caprices of public favor or antagonism.

The initial step in this direction has been taken in the inauguration of the Endowment Fund by George S. Terry, - with a donation of \$5,000. The Society's gratitude to Chairman Terry can best be expressed by an equal devotion on the part of each of us to its development.

By the provision of bequests from our own estates, and by the encouragement of similar bequests and donations from others, the Endowment Fund can be brought to a strength adequate to insure the Society's continued functioning under any conditions.

May Chairman Terry be adequately recompensed for his wise and generous gift through the accomplishments of this Society.

ANNUAL MEETING

The first Annual Meeting of the Duodecimal Society was held in New York on January 27th. The Treasurer, reporting a cash balance of \$396.82, submitted a budget of \$1225.00. This being deemed within our reasonable anticipations, was approved.

The publicity results, reported for 1944, were better than expected. In addition to the publication of the second edition of President Andrews' "New Numbers", and his article in *Mechanix Illustrated*, there were several other magazine references, three newspaper appearances and several minor items, and two announcements and discussions in radio broadcasts. In the December issue of *The Mathematics Teacher*, there appeared an article on "The Duodecimal System", by W. C. Janes.

The present officers will continue through 1945. Vice President F. Howard Seely was elected Chairman of the Nominating Committee, which is to submit to the Board of Governors, prior to the Annual Meeting next January, nominations of the officers for 1946. F. Morton Smith was elected Auditor.

To improve and coordinate our consideration of the various elements of the duodecimal system, President Andrews announced the creation of special committees, which will entertain proposals within their special fields, and act as centers of reference, discussion and correspondence. They will submit reports of developments to the Executive Committee from time to time. The following Chairmen were appointed:

Weights and Measures	Ralph H. Beard, 20 Carlton Place, Staten Island 4, N. Y.
Nomenclature and Symbology	Kingsland Camp, Rm. 1009, 393 Seventh Ave., N.Y. 1, N.Y.
Theory of Numbers	George S. Terry, 507 Main St., Hingham, Mass.
Mathematical Recreations	George S. Terry, as above.
Navigation	Ralph H. Beard, as above.

It was decided that husbands and wives might exercise joint membership at no additional cost, but that the spouses would be required to undertake the regular lessons and examinations before they would be accepted to advance standing. The privilege of joint membership was not extended to include other members of the family.

Each year, the Society will honor those who have made noteworthy contributions to the development and use of duodecimals, by the presentation of an Annual Award, and a citation of their accomplishments in, and for, duodecimals.

The Annual Award for 1944, and the Annual Award for 1945, were approved as nominated, and will be announced later. Their presentation will be the subject of a general press release.

NEW FRIENDS

We welcome to the Society, and to the exciting exploration of duodecimals, the following Aspirants. We list their addresses and special interests to facilitate correspondence between those intrigued by similar phases of the general problem.

Kingsland Camp, F.A.S.,
Rm. 1009, 393 Seventh Ave., N.Y. 1, N.Y.
Special interest: Nomenclature and Symbology, Number Theory,
The Slide Rule.

W. B. Campbell,
626 Broadway, Cincinnati, Ohio.
Special Interest: Nomenclature and Symbology.

Mrs. Gertrude Carpenter,
225 Sterling Place, Brooklyn 17, N.Y.
Special Interest: Weights and Measures.

Pierce Annesley Chamberlain, Jr.,
1641 Forest Hill, Plainfield, N.J.
Special Interest: Radio, Physical Constants, Weights and
Measures.

Pvt. William S. Crosby,
1st Plat., Co. B, 53rd I.T.B., Camp Howze, Texas.
Special Interest: Nomenclature and Symbology, Weights and
Measures.

Paul E. Friedemann,
4124 Greensburg Pike, Pittsburgh, Pa.
Special Interest: Number Theory, Nomenclature and Symbology,
The Slide Rule.

Prof. H. Harold Hartzler,
Goshen College, Goshen, Indiana.
Special Interest: Mathematics, Number Theory.

H. K. Humphrey,
520 Ash St., Winnetka, Illinois.
Special Interest: Number Theory, Ideology.

Cpl. Dallas E. Lien,
Alaska Communication System, Box 219, Anchorage, Alaska.
Special Interest: Weights and Measures.

Mrs. Robert C. Lloyd,
20 Carlton Place, Staten Island 4, N.Y.
Special Interest: Weights and Measures, Physical Constants,
Micro-wave Radio.

Harry G. Riblat,
R. D. 5, Arbuckle Road, Erie, Pa.
Special Interest: The Slide Rule, Number Theory.

Lt. Eugene M. Scifres, A.A.C.,
1614 Berry Boulevard, Louisville, Kentucky.
Special Interest: Navigation, Mathematical Tables.

Thomas J. Seaton,
Moosup, Connecticut.
Special Interest: Ideology, Mathematics.

Lewis Carl Seelbach, C.P.A.,
163 Davidson Ave., Buffalo 15, N.Y.
Special Interest: Number Theory, Ideology, Mathematics.

BIBLIOGRAPHY

That John Do who first found it convenient to pack things by dozens, probably had little idea of the value of his discovery. But since his day, many men have realized that counting by dozens offers the same relative advantages over tens, that packing by dozens does. Some of these men took the trouble to put their ideas into writing, but the thoughts of most of them are irretrievably lost. Every now and then, another of these old essays on duodecimals comes to light, and we are the richer by the discovery of another valiant ancestor who has explored this field before us.

Librarians and bibliographers face a peculiar problem in selecting the most fitting index for a duodecimal reference. Some of the listings that are commonly used, are: arithmetic, dozen, duodecimal, notation, number, numeration, theory of numbers, and weights and measures. But many others may be used, and duodecimal material has been found under such headings as: counting, density, factors, figures, metric, (and anti-metric,) metrology, reform, standards, and twelve.

Thus it is quite possible that many a valuable thought on duodecimals is lost in the shelves of our libraries, hidden behind some peculiarity of indexing. There may be one such treasure in the library nearest you. The search is enjoyable, and a discovery is a thrill.

Check the headings cited, and any others that may occur to you. Report carefully every dozenal reference you locate, giving details of author, title, publisher, date, chapter, and page. With your collaboration we will accumulate a bibliography of duodecimals that is representative. And we will have made available much valuable material. Nearly every writer develops some idea, peculiarly his own. Each of these is important. Every idea that eases the adaptation of duodecimals to current uses, saves time and friction.

The most complete bibliography on duodecimals now available will be found in Appendix A, of the recent reprinting of President Andrews' book, "New Numbers".

RES PUBLICAE

Duell, Sloan & Pearce, under their blazon of Essential Books, have just published a second edition of the "New Numbers", of President F. Emerson Andrews. It is priced at \$2.50. The first edition was published by Harcourt, Brace, and has been out of print for some time.

This book is important to Dodekaphiles because of the simple clarity of its presentation of the duodecimal system. In the new edition, Mr. Andrews has added several items to the bibliography, and some new material on the recent developments in terminology.

Mr. W. C. Janes, of Manhattan, Kansas, has written an article on "The Duodecimal System", which appears in The Mathematics Teacher for December, 1944. Mr. Janes' exposition of the duodecimal arithmetic is very understandable, and his presentation is original. He seems unaware of the works of Andrews and Terry, and of the existence of this Society.

President Andrews will deliver a talk on duodecimals to the Society of Teachers of Mathematics in High Schools, at the Faculty Club of Columbia University on February 24th.

As is his custom, ye Ed. wrote a lengthy reply to a recent pro-metric editorial in the N. Y. Daily News, suggesting that it would be wiser, if any change is to be made, to change to the duodecimal system, rather than to the imperfect metric system. The News carried the reply, in much abridged form, on the editorial page of January 22nd.

Your supply of duodecimal literature may be obtained through this office. We will be glad to help you in any way we can.

Without charge, we will gladly mail to any names you suggest copies of the folder, or of The Duodecimal Bulletin. Ordered in quantities, the Bulletins are 10¢ each, and the folders are 25¢ the dozen.

Pamphlet reprints of F. Emerson Andrews' "An Excursion in Numbers", are 10¢ each. They form an excellent means for introducing your friends to duodecimals.

Copies of George S. Terry's "The Dozen System", are furnished Aspirants without charge. Additional copies cost 50¢.

MATHEMATICAL RECREATIONS

Your explorations will uncover many superiorities peculiar to duodecimals. Set them down, and send these papers to us. Here is one such from George S. Terry, who says that it is not original, but that Mr. Andrews announced this discovery in his "New Numbers"; the algebraic analysis, however, is new. We would greatly enjoy receiving similar studies from others.

On Constructing a Table of Consecutive Squares without Multiplying. by George S. Terry.

The usual method of writing down $(N+1)^2$ from N^2 , is to add $2N+1$, and is applicable to any base, or method of counting. This operation involves multiplication by 2.

Thus, decimally, $4^2=16$. Therefore, $5^2=16+2(4)+1=25$
 or, duodecimally, $4^2=14$. Therefore, $5^2=14+2(4)+1=21$

The simpler sequence of endings for duodecimal squares offers an alternative method involving addition only.

Consider N in relation to its nearest sextet, a sextet being a number ending in 6 or 0. Any N is of the form:

$$6n-2, \quad 6n-1, \quad 6n, \quad 6n+1, \quad 6n+2, \quad \text{or} \quad 6n+3,$$

the last figures of whose squares are:

$$4, \quad 1, \quad 0, \quad 1, \quad 4, \quad 9;$$

and these last figures can be written down in this order for any length of table, in the units place. The difference between the figures in the dozens place for consecutive squares always is n. We will call n the characteristic of the sextet. Thus, if we let $n=3$

N	N^2	$(N+1)^2$	Difference in dozens place
$6n-2=14$	$30n^2-20n+4=194$	$30n^2-10n+1=201$	n
$6n-1=15$	$30n^2-10n+1=201$	$30n^2=230$	n
$6n=16$	$30n^2=230$	$30n^2+10n+1=261$	n
$6n+1=17$	$30n^2+10n+1=261$	$30n^2+20n+4=294$	n
$6n+2=18$	$30n^2+20n+4=294$	$30n^2+30n+9=309$	n
$6n+3=19$	$30n^2+30n+9=309$	$30n^2+40n+14=344$	n+1; but

the $N+1$ step is where we enter the next sextet, and $n=4$. This becomes $6n-2=14$ $30n^2-20n+4=344$.

Then, to construct a table of consecutive squares, start with N^2 and fill in the units place by inspection; fill in the dozens place by adding the characteristic of the nearest sextet; when the previous square ends in 9, use the characteristic of the succeeding sextet. Thus, starting with $30^2=900$, the characteristic of the sextet is 6.

31^2	ends 1.	Add 6 in the dozens place, and we have	961
32^2	4		104
33^2	9		169
34^2	4		214, etc.

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ON MULTIPLICATION TABLES

by Kingsland Camp, F.A.S.

Why, in presenting the duodecimal multiplication tables, need we follow the same unimaginative, routine scheme, familiar to us since our kid school days?

Would it not be more helpful to omit both the line and column of the 10-multiples? This would produce a more symmetrical table and better emphasize the characteristics of the new system. It would particularly accent the symmetry of occurrence of the 0 and 6.

1	2	3	4	5	6	7	8	9	X	XI
2	4	6	8	X	10	12	14	16	18	1X
3	6	9	10	13	16	19	20	23	26	29
4	8	10	14	18	20	24	28	30	34	38
5	X	13	18	21	26	22	34	39	42	49
6	10	16	20	26	30	36	40	46	50	56
7	12	19	24	22	36	41	48	53	5X	65
8	14	20	28	34	40	48	54	60	68	74
9	16	23	30	38	46	53	60	69	76	83
X	18	26	34	42	50	5X	68	76	84	92
XI	20	29	38	47	56	65	74	83	92	XI

This forms a perfect square of numbers and includes all products that need to be learned. The major diagonal, from 1 to XI is the line of squares, emphasizing the beautiful sequence, 0, 1, 4, 9, of the endings of even powers of duodecimal numbers. This diagonal divides the table into identical halves, and only one of these halves would need to be shown.

The terminal digits of the whole table are symmetrical with regard to either diagonal. This symmetry extends to the small 5 x 5 squares in each corner, which have many excellent little harmonies within themselves, as well as with each other.

ARITHMETRIX

Carl Seelbach started this with a postcard. He set forth two illustrations of cases wherein two whole numbers and their sum use each integer once, and only once. George Terry countered with illustrations giving maximum and minimum sums. The same mail carried a similar exhibit from Carl. They have been glee-

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fully swapping punches ever since. Terry's prize wallop was a list of exactly 200 such sums.

This is not a private scrimmage. Anybody can kick in. Can you better their examples? They have not yet started on the differences of two numbers. And there might be a relationship between two numbers, their sums and differences, for such cases. Furthermore, that 200 seems to be a very round figure.

Minimum Sum

1 0 7 9
2 4 X 2
3 5 8 8

George Terry lists
1 2 X
sums between.

Maximum Sum

9 3 2
2 X 5 4
1 0 7 8 8

MATHEMATICAL CRYPTOGRAM

In each of the following examples of long division, the dozenal figures have been replaced by the letters of a word. What is the word? The one puzzle is fairly simple.

CM) S C R
I A H E
T S
P R H
P O C
C P E
Y T R
Y R

STP) S C R G I
Y H C N
E U S

THE SPECIAL COMMITTEES

In the report of the Annual Meeting, carried in this issue, mention is made of the creation of Special Committees which are to act as centers of reference, discussion and correspondence in their special fields. A more detailed delineation of their functions may serve to make them more useful to the individual member.

Take the Committee on Weights and Measures for instance. Chairman Beard has done considerable work on the duodecimal metric system, based on the palm, the pint, and the pound. He calls this the Do-Metric System. Mr. Andrews, in the latest issue of his book, "New Numbers", advances a similar system based on the inch and the foot, rather than on the palm. Let's suppose that you are interested in the metric problem, that you have several questions to ask, and that you have a proposal, or two, to make. Therefore, you write to Chairman Beard and set forth your questions and ideas. He will answer your questions, comment on your suggestions, and give you any information he may have on similar or opposed suggestions, and who made them. Thus you will be advised of what is being done about the particular factor in which you are interested, and which of the members may be similarly interested.

This will enable to discuss your ideas directly with those most intimately concerned, avoiding needless delay and uncertainty. Mr. Beard will thus know of your interest, and your ideas. He can inform others of your interest, and he will, from time to time, summarize such developments in an item for the Bulletin. (Chairmen please note. Ed.)

The same sort of situation exists with regard to the other committees. Chairman Camp, of the Committee on Nomenclature and Symbology, is deeply interested in the development of entirely new names for duodecimal numbers, and a completely different arrangement of symbols for them. There will undoubtedly be situations where the use of distinctly different terms may be essential. You may inquire from him what has been done in this direction, and what his ideas may be. Your inquiry will be valuable to him, and he may be able to help you avoid needless duplication of work already done by someone else.

In replying to your inquiry, the chairman may suggest that you embody your idea in a paper to be submitted to the editor of the Bulletin. The publication of your article will bring your idea to the attention of all the members, and may supplement or modify the duodecimal proposal.

Thus your thinking may expedite the use of duodecimals, and increase the advantages they offer.

MO FOR MEGRO

For several years we have used the term "megro" to represent 1,000, this being a shortened name for meg-gross, or great gross. As it becomes clear that the names for the first three powers of the "do" will also be used as prefixes for similar relationships among the weights and measures, (as in doyard, and groyard), it seems advisable that the two-syllabled "megro" be further shortened to "mo". The ascending progression will then be: do, gro, and mo.

While there has been no special practice as to the descending succession, there has been some use of "doth" to represent one-twelfth, and "groth" as one part of a gross. In place of this awkward construction, the use of the prefix "e" has been accepted as meaning "of, or out of". Thus, one "edo" means one out of a dozen, or one-twelfth. And in place of "percent", we have "egro". The ascending and descending progressions are:

1	One		
10	Do	.1	Edo
100	Gro	.01	Egro
1,000	Mo	.001	Emo
10,000	Do-mo	.000,1	Edo-mo
100,000	Gro-mo	.000,01	Egro-mo
1,000,000	Bi-mo	.000,001	Ebi-mo
1,000,000,000	Tri-mo	and so on.	

THE DUODECIMAL SOCIETY OF AMERICA

20 CARLTON PLACE



STATEN ISLAND 4, N. Y.

The Duodecimal Society of America is a voluntary nonprofit organization whose purpose is to conduct research and education of the public in mathematical science, with particular relation to the use of Base Twelve in numeration, mathematics, weights and measures, and other branches of pure and applied science.

Membership is by invitation, and full membership with voting privileges requires the passing of elementary tests in the performance of twelve-base arithmetic. Membership is of three grades.

Aspirants are those persons acceptable to the Society, who signify their desire to become members. The Aspirant is eligible for the publications and general services of the Society, but is not a voting member. Material is furnished that will help him to prepare for the examination leading to full membership. The examination is a brief written test taken whenever the Aspirant feels himself ready.

Members are Aspirants who have passed their test, and are thereupon eligible to vote and hold office in the Society.

Fellows are those Members who are adjudged by the Directors of the Society to merit special distinction through their contributions, by research or otherwise, to the development of duodecimal mathematics.

The Society's charges as now established, are an initiation fee of three dollars, and annual dues of three dollars. These fees must accompany applications for membership, but will be returned if for any reason the application is not accepted. No fee is charged for the examination leading to full membership if the examination is taken within the first year. The purpose of the fees is to carry in part the running expenses of the Society, the cost of the Bulletin, and other publications. All officers, and members of the Board of Governors serve without salary.

From any Society of this nature, members benefit in proportion to what they put into it. The friendly association with keen minds engaged in the same new adventure is a real pleasure.

It is already demonstrated that duodecimals can effect great savings in labor in many practical problems. There are many duodecimal problems still to be solved; such as the proper correlation of the weights and measures, and the scientific units. If this type of research and development interests you, your application for membership is cordially invited.