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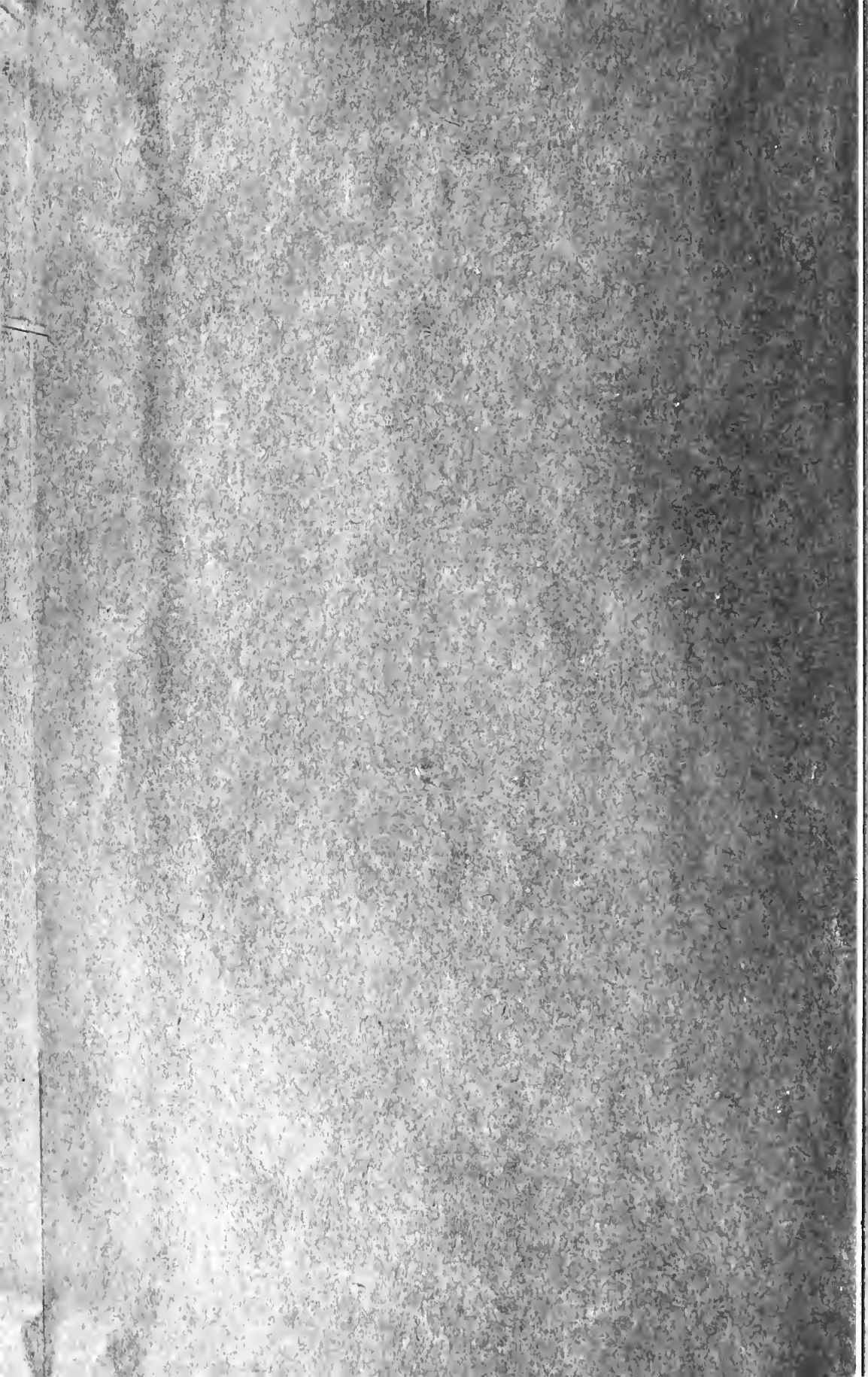
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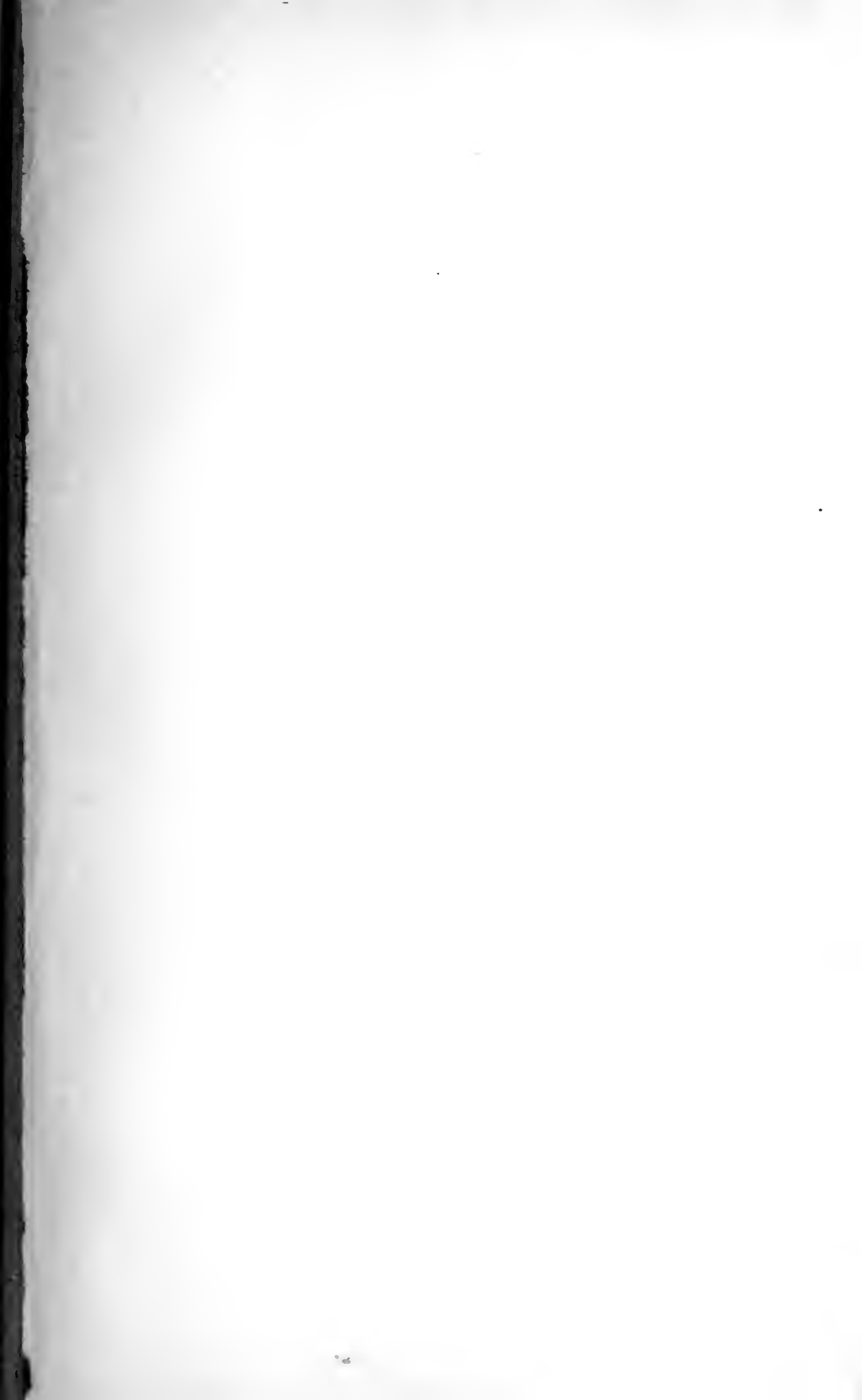
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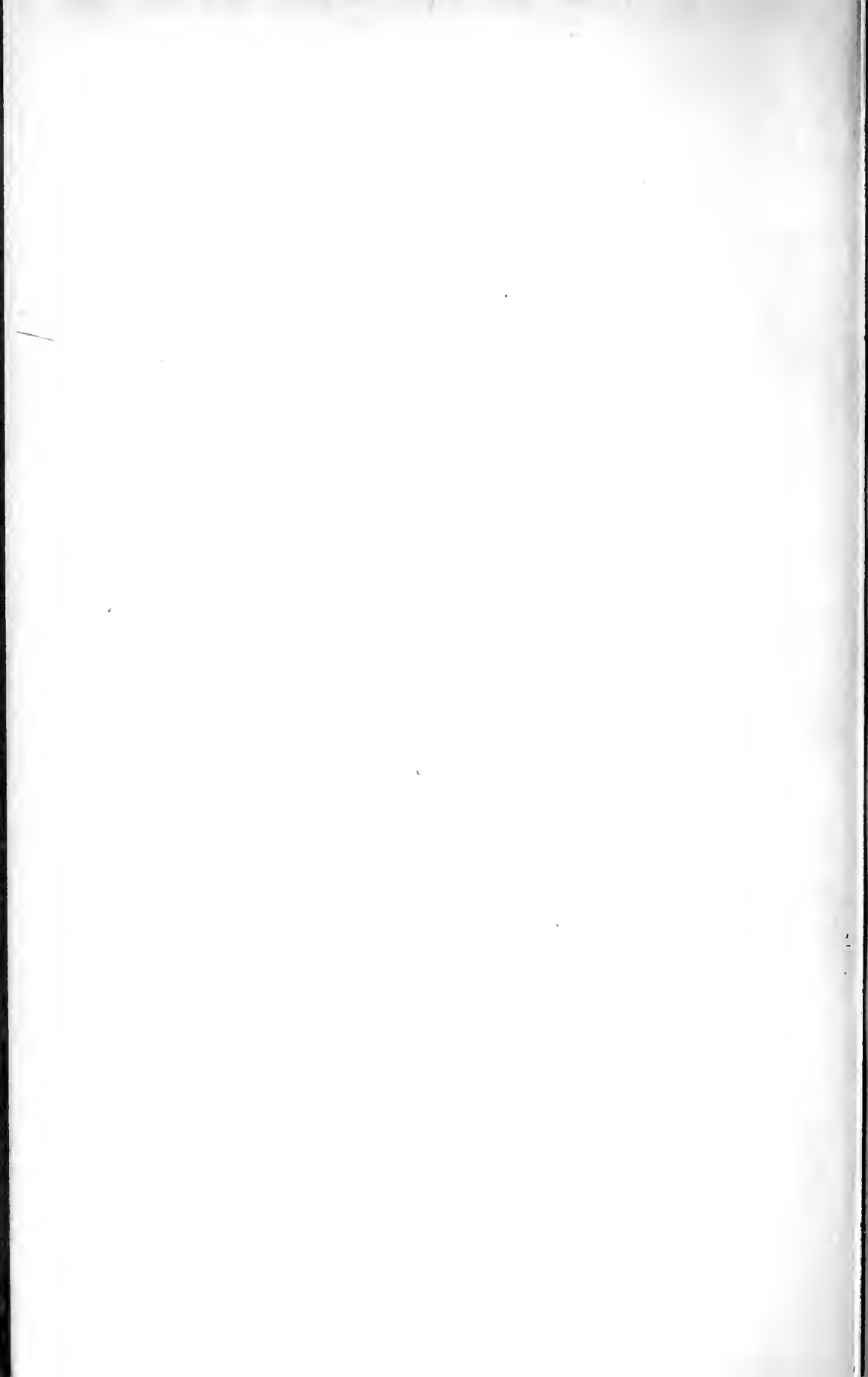
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HIGH SCHOOL SCIENCE CLUBS

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PREFACE

Recently the extra-curricular activities of our schools have been receiving much attention. This is as it should be because they make important contributions to the education of boys and girls. In order to capitalize fully the possibilities of these activities wise direction by the teachers and by the school in general is essential. This study of science clubs in high schools is presented in the hope that the information collected will be useful to teachers and high-school principals. The annotated bibliography will be of service to those who desire to study the topics further.

WALTER S. MONROE, *Director*

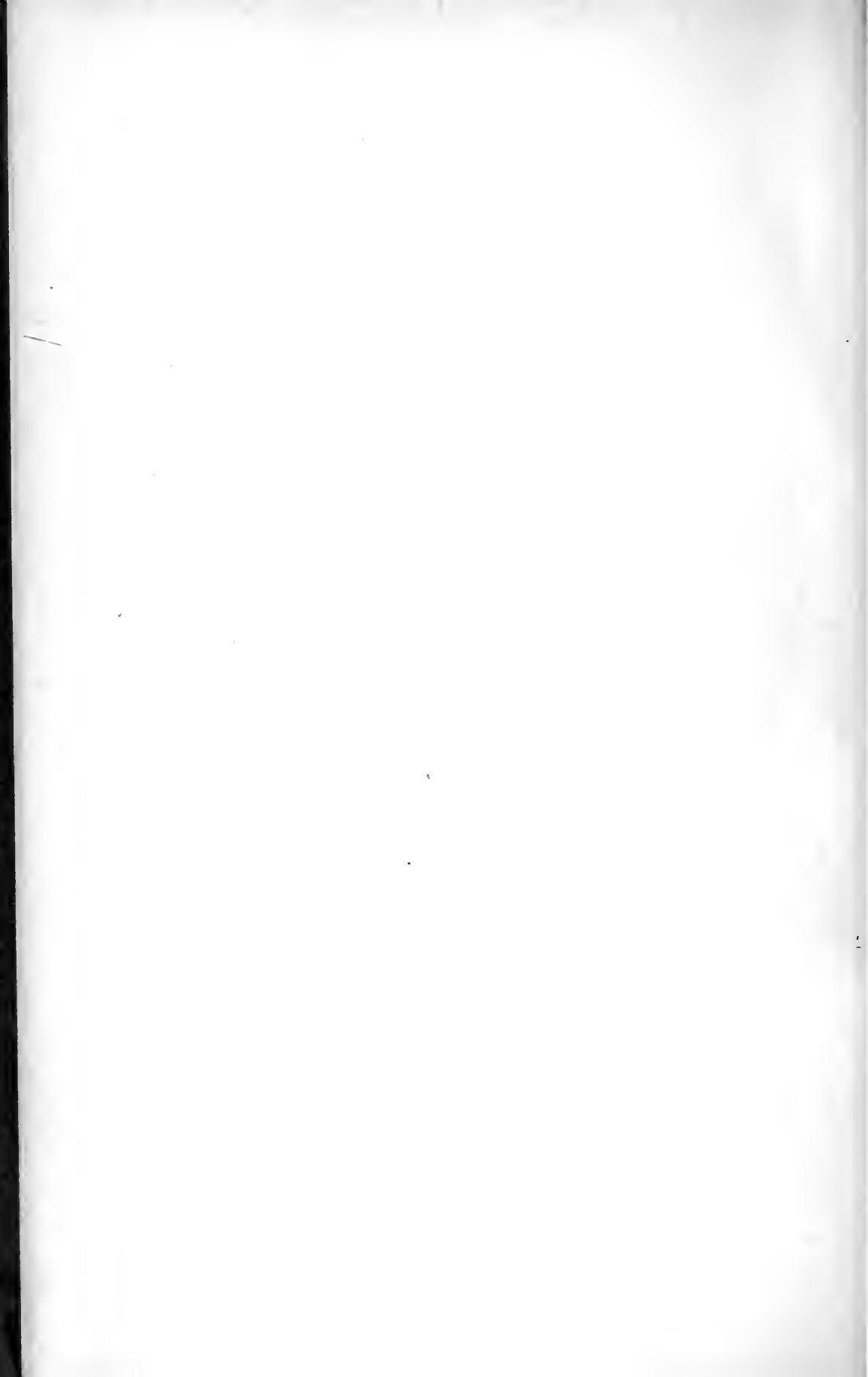
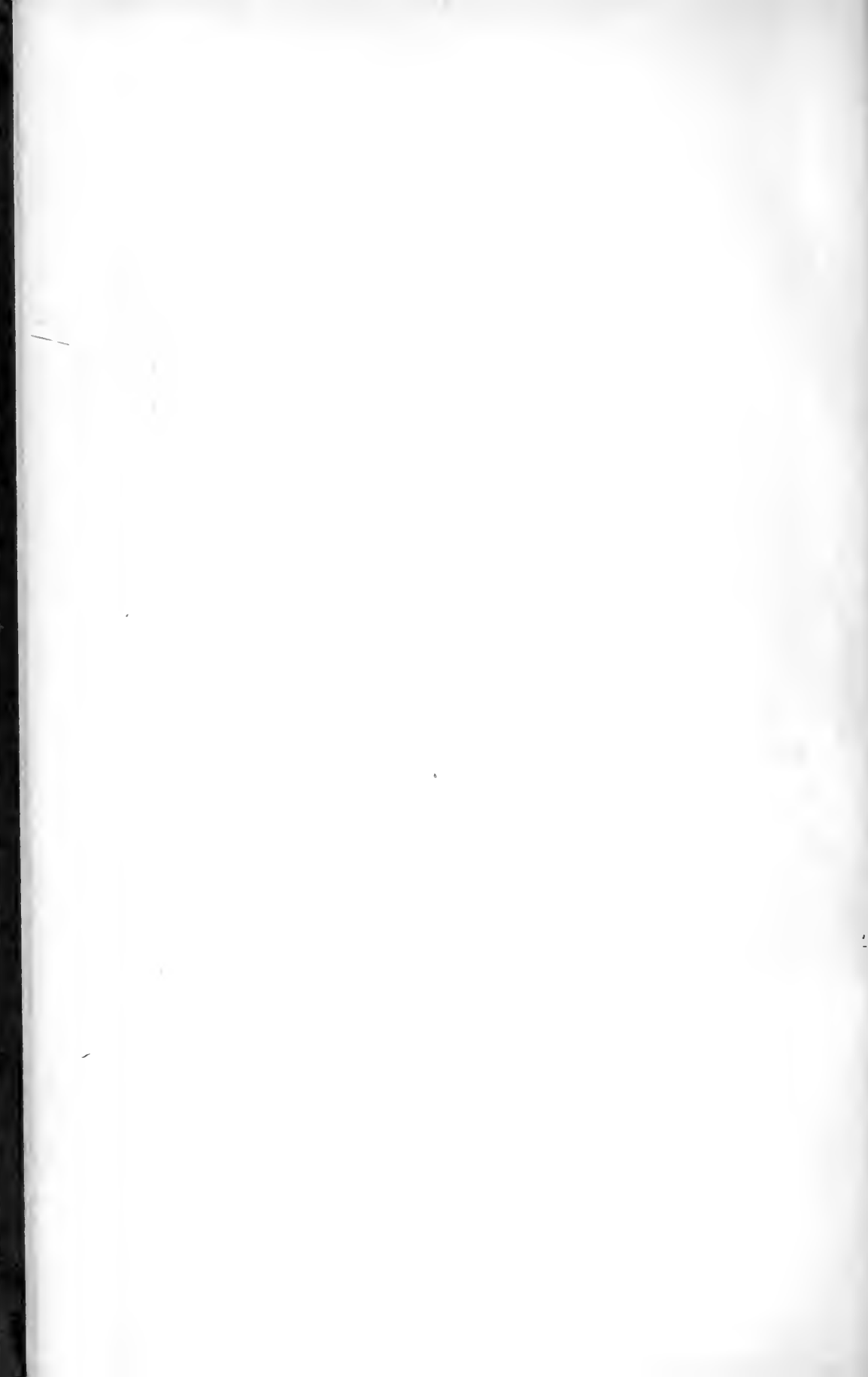


TABLE OF CONTENTS

	PAGE
CHAPTER I. INTRODUCTION	7
CHAPTER II. PURPOSES, RULES, AND REGULATIONS	9
CHAPTER III. ACTIVITIES	16
CHAPTER IV. SOME GENERAL PRINCIPLES RELATING TO SCIENCE CLUBS	25
CHAPTER V. ANNOTATED BIBLIOGRAPHY	36



HIGH SCHOOL SCIENCE CLUBS

CHAPTER I

INTRODUCTION

Plan of this bulletin. This bulletin consists of three parts. The first is an account of the science clubs reported by teachers of science in Illinois high schools during the school year, 1930-31. Two chapters, the second and the third, are devoted to this account. Chapter II deals with the general purposes of the clubs and their rules and regulations concerning such points as membership, officers, meetings, dues, and other more or less formal matters. Chapter III is primarily concerned with the programs and other activities of the clubs. The second part of the bulletin, Chapter IV, contains comments on the science clubs described in Chapters II and III and offers suggestions concerning such clubs in general. Chapter V, the third part, contains an annotated bibliography dealing with the subject. Of the two authors, Odell is primarily responsible for the first part, and Astell for the second. The bibliography was assembled by Astell and put into its published form by Odell.*

The collection of data concerning science clubs in Illinois high schools. During the school year, 1930-31, a letter was sent to every science teacher named in the lists of high-school teachers in the "Illinois School Directory" for that year. This letter requested that wherever a science club of any type existed either the teacher addressed or someone else should send a description of it and its activities to the Bureau of Educational Research. Ten or twelve particular points were specified about which information was desired, and, in addition, teachers or others were asked to supply any other information that seemed worth while giving. Responses were received from about one hundred schools, of which about fifty reported clubs. In addition to a few descriptions of clubs in agriculture and other fields not included within the study, usable reports were received from forty-seven schools and described a total of fifty-five different clubs. Of these schools two reported three clubs, four, two clubs, and the remainder, one club each. Five of the six that reported more than one science club are distinctly large high schools, three of them being in Chicago. The descriptions of the clubs received ranged from brief enumerations of a few facts concerning them to accounts several pages in length plus, in a number of cases, mimeographed or printed material.

*Valuable assistance was given T. T. Hamilton, Jr., of the staff of the Bureau of Educational Research, in checking the bibliography and preparing it for publication.

There were undoubtedly other science clubs than those reported in operation in Illinois high schools in 1930-31. The writer will not venture to make an estimate of the total number in the state, but from his knowledge of the situation he believes it probable that most of the existing science clubs, especially the more vigorous ones, were reported. Although many of the responses were not complete enough to give all the desired information, the writer believes that on the whole the data collected provide a reasonably satisfactory picture of the science clubs now existing in Illinois high schools.

Several of those responding to the letter of inquiry stated that in their schools there were no formal science clubs with organizations but that either during regular class periods or at other times many of the activities commonly engaged in by clubs were carried on. When the meetings are not in regular school time, there is no stated membership list but all who are interested may attend. Usually meetings are called by the teacher whenever he sees fit to do so. In some schools pupils suggest that meetings be held. From the quite informal organizations reported by some of the clubs it appears that the line of demarcation between what is a club and what is not is not easy to set.

CHAPTER II

PURPOSES, RULES, AND REGULATIONS

Score and purpose. From a rather narrow standpoint the scope of the clubs reported is well indicated by their names, although from other information given it is apparent that names are not always accurate indices of the characters of the clubs. Twenty-four of the fifty-five clubs appear not to be limited to any particular subject or branch of science but to deal with the field of science as a whole. Of the others, five each are called biology clubs, nature-study clubs, and physical-science clubs. The first two, presumably, do not differ a great deal in their fields of interest. From one to four clubs appear by their names to be devoted to each of the following more specialized fields: aeronautics, astronomy, botany, chemistry, general science, geology, photography, physics, and zoology.

The fact, stated in the preceding paragraph, that the names of some of the clubs do not accurately indicate their purpose is due chiefly to two causes. One is that in some cases the interest of a club centers around a small portion of the total field indicated by its name. Thus one of the so-called physics clubs appears to devote its attention entirely, or almost entirely, to photography, and one of the zoology clubs limits its field to birds. The second cause is that the purpose of several clubs bearing names of single science subjects is definitely stated to deal with other sciences than the one indicated by the name. Therefore, although the name is ordinarily that of the subject which the members have studied or are studying, the chief purpose of such clubs is to broaden the scope of scientific interest in other subjects.

The purposes of the clubs in their various fields, whatever they are, are stated in a number of ways. The most common aim mentioned is that of arousing general interest and appreciation; others given are: to keep up with the progress of modern science, to study the applications of science in industry and elsewhere, to correlate science with school and life activities, to become acquainted with science courses offered in the schools, and so forth. In addition, a number of the clubs state aims that are not particularly connected with science. Examples of this are: to promote high scholarship, to develop friendship among pupils and teachers, to promote general intellectual development, to discover pupils of unusual ability, to "boost" other high-school organizations, and, as one pupil officer writing concerning a club expressed it, "to have fun."

A more complete idea of the significance of the various purposes stated will be gained by reading Chapter III, which is devoted to the

activities of the clubs. However, it seems well here to give in full, or approximately in full, the lists of purposes of several of the clubs which have evidently given unusual attention to the matter and have developed such lists. Thus one club states its particular purpose to be to attract birds, to feed and to protect them, and to support legislation favorable to them, and its more general purposes, to increase scholarship, to stimulate interest, to create appreciation, to increase knowledge of the progress of modern science, to acquaint pupils with the courses offered in science, and to stimulate friendship among pupils and teachers. Another club lists seven purposes in its constitution. These are: to report and discuss topics of scientific interest, to further interest in biology, to volunteer to further any organization in the high school, to learn to appreciate this world, to learn by doing, to promote higher standards of efficiency, and to promote friendship among students taking the same course. In another club the purpose is given as the stimulation of interest in better scholarship, the promotion of participation in intellectual contests, the encouragement of participation in scholarship examinations, the visitation of local industries where scientific processes are being employed, the reporting of the findings in English, and the demonstration of experiments. Still another statement of purposes, as given in the initiation ceremony of a club, lists the creation and fostering of interest in science, the maintenance of the scientific spirit, the furtherance of scientific methods, the promotion of friendly relationships among those engaged in scientific work, assisting in investigations, making known through discussions the material, educational, and other resources of the commonwealth, and the finding in these activities of the vital correlation between the scientific, the social, and the moral activities of the school and the community.

Typical of the briefer statements of aims are "to further interest in and promote investigation of matters relating to present-day equipments and experiments in all branches of science," "to arouse interest in nature study," "to maintain interest in biology and its problems," "to broaden interest and knowledge of related sciences," and, in the case of a club which has changed its aims, formerly, "to have snappy, interesting programs quite different from school life," but now "to further advanced students scholastically and intellectually."

Eligibility to membership. The provisions as to who may become members of the clubs vary a great deal in different schools. The most common provision, which, however, is found in only about one-fifth of the clubs, is that any one interested may become a member. In two or three clubs they must do so at the beginning of the semester or must be interested enough that they agree to participate in programs. Presumably, few pupils who are not or have not been in a science course are interested enough to join most clubs. The next most com-

mon provision is that any pupil who is taking or has taken science may join. In the case of clubs in particular sciences memberships is usually limited to the science with which the club is concerned; that is, if it is a physics club in question the applicant must have taken or be taking physics, and similarly with others. In a few clubs membership appears to be limited to those who are taking science at present, so that those who may have had such courses in the past but are no longer carrying them are not now eligible.

Apart from the requirements stated above there are no others that, in full details, are common to more than three of the clubs. Many of the same provisions appear in the requirements of the various clubs, but are combined with others in different ways from club to club. Among these requirements which exist either singly or in combination with one or more others requirements are: making passing marks in science or in all subjects, making passing marks in three subjects, making certain specified marks considerably higher than passing in science or in all subjects, membership in the freshman class, sophomore or higher standing, junior or higher standing, the doing of an individual project in science, membership in a second-year science class, recommendation by the teacher, election by the members, and lack of membership in any other school club.

In three cases it was stated that all members of a given class automatically become members of the club. In several others where this was not stated, it appeared from other information given that this was the case. In some such cases club membership appears to be required, whereas in others it is stated that, although all members of the class automatically become members of the club, they may be excused from attending if they desire. In some of these cases in which all members of the class are considered in the club, it appears that a club meeting is scarcely more than another meeting of the class and frequently takes place at the regular class period.

A few of the clubs have different classes of members, but in most this feature does not appear to exist. Thus one has active and associate members, the latter being those who are interested but cannot attend meetings. Except for doing so they assume the same obligations as active members. Another elects a limited number of honorary members from among pupils or others. In a few, teachers are elected honorary members. In several cases alumni membership is provided for, sometimes accompanied by a provision for a single fee for permanent membership. In one school no club may contain both boys and girls, but separate clubs exist for the two sexes.

In several cases clubs are not satisfied with requirements for entrance alone, but also have them for the maintenance of membership. Such requirements are in terms of either school marks in science or in all subjects, or of activity in the club. For example, in one club a

pupil must make ten points per month to maintain membership, these points being earned by activity in the club; in another he must not have more than three unexcused absences from meetings; in another he must appear on the program at least once a semester. Usually members who are dropped for not meeting requirements may be reinstated if they make up their deficiencies.

In a few cases higher requirements are stated for officers than for members. Thus in one or two clubs in which marks have no connection with membership, officers must be doing passing work, and in one or two others in which all members must be doing passing work, officers must reach a standard somewhat above that.

In most reports nothing was stated about the membership of teachers, but in a few clubs, most of which are in quite large high schools, it is definitely provided that only those teachers elected by the club may become members.

Size. The size of the science clubs reported varies from 7 to 465 active members. It is noteworthy that the club having only seven is an honorary club with rather high requirements in a fairly small school, whereas the one with 465 members, though not an honorary club, includes in its requirements for membership the making of one of the two highest marks given in the school. It exists in a large high school and has over fifteen hundred alumni members in addition to the active ones.

The general trend in the size of clubs is from about twenty or twenty-five to fifty. This range includes well over half of those reporting membership figures. Only two in addition to the one mentioned above reported more than one hundred members, and only three in all, less than fifteen.

It appears that in the majority of the clubs there is no stated limitation in the size of the membership, but about one-third of those that reported membership figures stated that they have such limitations. In these, the maximum number of members varies from twenty-five to one hundred. The one club with a limit of one hundred is, however, the only one with a limit greater than sixty, and it was stated that this limit of one hundred was to be reduced.

Organization. The portions of the reports concerning the details of organization were not so full as were those concerning most of the other topics dealt with in this chapter. They do serve, however, to give a fairly good idea of the general trend in this regard. Most of the clubs elect four officers—president, vice-president, secretary, and treasurer. Several have only three, either combining the duties of the secretary and treasurer or electing no vice-president. One or two clubs appear to have no officer except a president or chairman, and one or two others, only two, a president and a secretary. No other officers than the four already named are very frequently chosen. A few of

the clubs, however, reported sergeants-at-arms, reporters, and editors. Practically all appear to have program committees, but other committees, especially standing ones, are not numerous. The others named are on membership, attendance, publicity, records, collections (of clippings, specimens, curios, and so forth), constitution and by-laws, affiliations, and club pins. In most clubs officers and committee members serve for either one semester or one year, but in a very few the term of office is less than a semester.

The report from one school stated that although there was considered to be but one club, each of the several sections of the class in connection with which it was organized elects its own complete set of officers. Despite the cooperation between sections, this situation should perhaps be described by saying that there are several clubs rather than only one. It was, however, counted as one in the figures given in the first chapter.

A few of the clubs have an organization that provides for division into units or into other groups. Thus, one club which as a whole is devoted to the general field of science reported units dealing with chemistry, stamp collecting, photography, and birds and nature. Apparently each member works in the unit dealing with the field in which he is most interested.

It appears that in general the clubs have no initiation fees but do collect dues from their members. None of the few initiation fees reported exceed seventy-five cents, and in connection with the one of this amount no later dues are charged. The most usual amount of dues is twenty-five cents per semester, and in comparatively few cases is there any great variation from this amount. Some clubs provide different amounts of dues for different classes of members. The most elaborate scale of dues of this sort reported provides that sophomore members shall pay thirty-five cents a year, junior members, ten cents a year, senior members, five cents a year, graduates, a single payment of fifty cents for life membership, and faculty members, forty cents per year until they have paid two dollars, after which no further dues are expected from them.

Few of the clubs mentioned formal constitutions and by-laws, but probably many of the clubs do have them. The reports from most clubs gave no information as to whether or not officers were eligible to reelection. In some instances, however, it was specified that an officer may not be elected to any office that he has held before; in others, that he may not be so reelected for successive terms; and in others, that he may not be reelected more than once. The general tendency appears to be against the continuance of pupils in the same office for more than one period of a semester or year.

Sponsors. In addition to the pupil officers mentioned in the preceding section practically every club has one or more faculty sponsors

or advisors. The usual practice is to have only one, although a few clubs have more, four being the largest number mentioned. In some clubs it appears that the sponsor is elected as frequently as are the other officers and thus changes from time to time, whereas in others, when a sponsor is once chosen he appears to act in that capacity as long as he is willing, or until he leaves the school.

In most schools the sponsor is the only faculty member in any way responsible for the club, except as the principal or superintendent may assume a general responsibility. In a few of the larger schools an assistant principal, dean of girls, or other official, exercises some general supervision.

It appears that in many clubs there is no formal election of a sponsor. The situation is often rather that the sponsor is the only science teacher in a small school, or the only teacher of a particular branch of science in a larger school, and therefore it is taken for granted that he will be the sponsor. In many cases the sponsor has suggested the idea of a club and organized it and accordingly continues to advise it without any suggestion of a change being made. There are, however, some clubs in which sponsors are elected by the members. In a very few cases they are appointed by the principal, and in one case it was reported that the school instructors are allowed to choose the clubs they wished to sponsor.

In general the authority of the sponsors is exercised indirectly rather than directly. In a few clubs the sponsors preside over at least a portion of the meetings, prepare the programs with little or no assistance from the pupils, and in other ways directly control activities, but these instances are the exception rather than the rule. The sponsor is frequently a member of the program committee, sometimes of other committees. In general, however, it appears to be the purpose of the sponsors to encourage the pupils to assume the direction of the clubs and to do at least most of their own planning. Not infrequently the arrangement is that program committees and others do their work without formally consulting the sponsors, but must submit the results of their labors to them for approval before they are put into effect. In a few instances there are definite provisions in the constitution and by-laws giving the sponsor absolute or limited control, or veto power, over the club activities. Several of the clubs provide that the sponsors shall score or criticize some or all of the performances of members. This is especially true where somewhat ambitious individual projects are undertaken. Despite the endeavors of sponsors to avoid assuming too prominent parts, it appears evident that, on the whole, most of the clubs would not flourish very long without the expenditure of considerable thought and effort on the part of their sponsors.

Meetings. Almost half of the clubs that reported on this item hold meetings approximately twice a month. The next most common

practices are one meeting a month and one a week. Two or three clubs have meetings less frequently than once a month, only one, more frequently than weekly, and two or three appear to have no stated times for their meetings but hold them at irregular intervals whenever suitable occasions arise.

The usual length of meetings is either one school period, ordinarily from forty to forty-five minutes, or one clock hour. The shortest reported are thirty minutes in length, and the longest regular time is an hour and a half. One or two clubs, however, reported that their meetings sometimes last two hours, and one, that it has had a meeting four hours in length. It was not made clear whether or not some of these longer meetings may have been trips, excursions, or parties rather than ordinary program or business meetings.

The most usual time for the meetings is immediately after school in the afternoon. About 40 per cent of the clubs meet at this time. The other times in order of frequency are in the evening, usually at seven or seven-thirty; during regular school hours, usually at the time of the regular class meeting; and during a period of the day devoted to special activities. This is usually the last period in the afternoon but occasionally occurs at some other time. There is perhaps a slight tendency for more of the meetings to be on Friday than on any other day of the week, but this is not very marked. In one or two cases the meetings are not all held at the same time. Thus, for example, one club which holds two meetings a month meets in the afternoon on the second Wednesday and in the evening on the second Friday of each month.

It appears that all of the clubs ordinarily meet in the school buildings, usually the regular laboratory or recitation rooms being employed for this purpose, although occasionally an auditorium, study hall, or some other room is used.

In a few cases it was reported that some or all of the meetings are open to visitors, ordinarily other pupils, and in one or two of these instances it was stated that the average attendance is regularly larger than the number of members. In most cases, however, only members attend the meetings.

CHAPTER III

ACTIVITIES

In the discussion of the various activities of the clubs no distinction will be made according to their announced purposes and names. The reason is that the purposes and names appear to exert no influence on the character of the activities carried on other than that the content dealt with therein is appropriate to the fields covered by the clubs.

Planning activities. In discussing the organization of science clubs in the last chapter it was stated that most of the clubs have program committees and that the sponsors usually either serve on these committees or cooperate with them in planning the activities of the clubs. In most cases these program committees are either elected or appointed by the president of the club, but in some cases, the officers themselves, or perhaps only some of them, form the committees. In only a few cases do the committees or the pupils themselves appear to plan the work of the club entirely independently of the sponsor.

Correlation with class work. In response to the request for information as to the extent to which the work of the clubs correlated with the class work of the pupils composing them, only about one-third of the reports received gave any data. Of those that did, several indicated that there was no, or very little, correlation. It appears, therefore, that on the whole such correlation exists in a decided minority of the clubs. Moreover, in a number of those in which it does exist it is not at all close. For example, it was reported that sometimes topics taken from the class work are used as a basis for programs, that occasional trips are planned to correlate with the regular work, or that some other small amount of correlation exists. In about half a dozen instances "close correlation," "direct correlation," "correlation whenever possible," or some similar expression was used. Apparently the programs of these clubs are largely devoted to extensions of the work being dealt with in class at about the time of each meeting and in extreme instances constitute little more than regular class recitations. In several cases it was stated that the club activities are correlated with the work in English classes, ordinarily through the writing of themes or the preparation of club publications. In one or two cases correlation with the art department in the preparation of posters and so forth was mentioned.

Credit for club work. There was only one answer received that indicated definitely that school credit is given for work done in a science club, but it appears probable that in other schools this practice is followed. These are cases in which the club meets at the regular

hour for class recitation and in which there is close correlation between the activities of the club and the regular class work. In other words it may be said that in these schools the club seems to be practically a motivating device for a portion of the class work, rather than an independent and separate organization.

In two or three cases it seems to be left to the decision of instructors whether or not actual school credit shall be given pupils for their work in science clubs. In such cases marks earned in class may be raised because of club activities, or these activities may be substituted for a portion of the regular assigned work of the class. It is usually optional with pupils whether or not they shall attempt to do anything that counts toward the regular class credits or marks. In a few instances the school maintains a point system supplementary to the regular marking system and includes activities in the science club among those for which points are given. The accumulation of such points may have no other concrete result than membership in lists of honor students, publication of name, and so forth, or it may be necessary for eligibility for various extra-curricular activities, such as athletics, dramatics, club membership, and so forth. In at least two cases the schools concerned require a certain number of such extra-curricular points in addition to credits in the regular school subjects before pupils are graduated, so that in these cases club activities may be said to contribute directly toward graduation.

Several of the clubs have point credit or merit systems of their own that are employed in connection with the activities of their members. As has been already referred to under eligibility for membership, a few clubs require members to earn so many points per month or per semester to remain in good standing or to retain their membership. Others give special recognition of some sort or another for earning specified numbers of points.

The points or credits allowed, whether they are school points or merely club points, are usually based upon participation in programs of the club. In some cases each program appearance counts the same number of points, whereas in others the number varies according to the type of contribution or according to its supposed difficulty or importance. In some instances the program appearances for which points are given presuppose work of some type or other in addition to the preparation of a talk. In a few cases points may be earned by mere attendance at meetings. Thus, for example, one club which requires one hundred points for honor rating allows forty of these to be gained by attending meetings, five for each attended. In a very few cases points are awarded those elected to office, or those who do work for the club other than appearing on programs, such as securing new members, working on publications, preparing scrap books and collections, and so forth, and in a few others competitions or contests of various sorts are held with points awarded as prizes. These may be member-

ship competitions, debates, the preparation of scrap books, posters or other materials for exhibition, and so forth.

One of the most elaborate point systems reported from any school, along with a few other details more or less connected with it, is as follows:

The two chairmen in each section were responsible for appointing four pupils in their respective groups to be prepared with reports of scientific nature. This method provides for eight separate speakers each week and might be altered if a special program was to be given. The students were instructed concerning the types of reports desired and were told that each report would be scored by the teacher according to the following scale:

<i>Subject Matter</i> —Its scientific value and worth to the class....	5 points
<i>Presentation</i> —Method of delivering and way in which the interest of the class was held. Sufficient length.....	5 points
<i>Original Comments</i> —Special comments which might be supplied, especially those which could be linked with something definite in the course which we had already studied. Practical applications, etc.....	5 points
<i>Present but Unprepared</i>	15 points

When the club day arrives the president takes charge of the meeting, and the class secretary reads the minutes of the previous meeting and records the minutes for the current meeting. The two chairmen have prepared lists of their respective speakers and their subjects and supply the president with these so that he is able to announce them in due form. Opportunity is always given for questioning before a speaker retires. At the close of the meeting the scores are read, comments are made by the teacher, and the totals for the two sides are computed and posted on a chart for that purpose.

In addition to the points given for oral reports, a large bulletin board is maintained, and points are given for suitable pictures brought in for posting. These come in so rapidly that there is usually a complete change of pictures about every other week.

A third source of club credits is in the periodic grades. We allow additional points according to the following scale on six weeks grades:—

A.....	5 points	D.....	2 points
B.....	4 points	E.....	1 point
C.....	3 points	F.....	5 points

At the end of the semester just closed the losing side gave a special program to the winner. Other methods of settling the contest might be used.

The principal of the school in which this club is maintained reports that he has found the plan quite satisfactory and that keen interest and competition is aroused among the pupils.

Activities at meetings. Although many of the clubs carry on activities outside of their meetings, the major efforts of a majority of them and the sole efforts of some are put forth in connection with their meetings. The activities to which the meetings are devoted are

in general such as would be expected by any one familiar with the situation. Talks by club members, including both pupils and teachers, and by outside speakers constitute the most frequent features of the program. These talks cover a wide range of topics. Sometimes they are reports of projects, experimental or otherwise, that have been carried on. Often they deal with trips made by the speakers to nearby places of interest. Occasionally they are more like travel talks. Other topics dealt with are the lives and works of noted scientists, current science events, books and articles dealing with scientific material, the development and history of particular branches of science and of particular inventions, scientific jokes, and so on. Not infrequently the talks are accompanied by slides or moving pictures. It is also rather common for them to take the form of experiments or demonstrations. The outside speakers are secured from various sources. Among the speakers mentioned are members of the staffs at various colleges and universities and at the Field Museum of Natural History, representatives of supply companies which sell materials commonly used in the field in which the club is interested, and experts from industrial, commercial, and professional pursuits.

It is not unusual that a considerable portion of the meeting is devoted to discussions which frequently follow formal talks already presented. Occasionally debates are held on various topics, such, for example, as "Whether or not the metric system should be adopted in this country." A number of the clubs attempt to secure a large participation from members by providing roll calls to which each member must respond in some way, frequently by giving a current science event, but sometimes by doing almost anything that is appropriate.

In some clubs there appears to be much more continuity to the programs than in others; that is, all, or practically all, of the speakers at one meeting or perhaps at a series of meetings discuss various phases of the same general subject. For example, one club reported that for three months it had been dealing with certain phases of astronomy, and another, that it had been studying radio through several meetings. A very few of the clubs adopt a topic that is followed for a whole year at a time. Thus, one sponsor reported that one of her clubs devoted a year to first aid, home nursing, and hospital training; another, a year to astronomy, during which time two trips were made to Yerkes Observatory; another, a year to taxidermy. In some cases projects carried on by a number of members of the club, or perhaps by all, serve as the chief basis of a series of programs.

As was mentioned in a previous chapter, some of the clubs have open meetings. At these there are frequently put on, in addition to experiments, demonstrations and other features previously mentioned, plays in some way concerned with science, stunt shows, and so forth. Thus, one club reports giving a play illustrating the value of science in everyday life in a general school program. Another reports not

merely giving a play, but writing one, rehearsing it until it was acted well enough for moving pictures to be taken and then showing these along with others to the entire school. Another reports the use of pantomines.

Comparatively few of the clubs specifically mentioned business as an item occurring at the regular meetings. Some have only one or two meetings a year, usually those at which officers are elected, at which any considerable amount of attention is given to business matters, but instead leave the officers to look after such affairs. Others transact some business at every ordinary meeting. A few have some provision such as alternate meetings for business; others limit the number. None have so few meetings as one or two a year.

In addition to the types of activities already described, which may be said in general to be for serious purposes, most of the clubs have some form of meetings designed for social purposes. Many of them merely reported having parties without going into detail as to just what is done at them. In some reports it was stated that they are largely dances; in others, that scientific games are played; in others, that musical numbers are provided; and in one report, that sleight-of-hand tricks are performed. A few of the clubs appear to have picnics more or less regularly. In general the tendency is to devote not more than one meeting a semester to purely social purposes. A few clubs reported nothing at all of this sort, and a few others, as many as five or six such meetings a year. Some have few or no whole meetings devoted to such purposes, but a portion of the time at some or all of the regular meetings is taken for games, refreshments, and other social activities. One club reported having a faculty tea regularly once a year.

It seems suitable to include, in connection with the discussion of programs, typical complete programs of a few of the clubs. The following are given as reported to the writer. The first is that in a science club of twenty-five members in a school of about 350 pupils.

- I. (1) Meeting called to order by president
- (2) Roll call and reading of minutes by secretary
- (3) Discussion of club business led by president or by chairman of committee appointed
 - (1) Projects for exhibitions
 - (2) Field trips planned
 - (3) Stunt show participation or auditorium exhibition by Science Club
- II. (1) Each meeting three members (chosen from alphabetical list of members) are designated to report current science features of interest that they have discovered and must attempt to analyze the material if necessary and answer questions of other club members. Each report to be about one and one-half minutes minimum length.
- (2) A student program feature (projection machine is available if wanted and is usually used); as an example, one student program

was on "Petroleum—Methods of Obtaining and Refining Processes and Products." Another is to be given by a zoology student on "Ant Colony Life"; usual length is about 15 to 20 minutes.

III. Usually some man of the community is asked to speak for a period of 15 to 30 minutes.

Some already given or planned are:

- (1) A Weather Bureau representative
- (2) Representative of a local silica company (mining)
- (3) One of the members of the local medical association

A typical program in the biology club of Harvard Community High School with a membership of ninety-four is as follows:

1. Opening—reading of minutes and other business
2. Roll call—answered by giving biological superstitions
3. Report of an interview with an official of City Health Department
4. Report of a visit to the local water supply system
5. Biological riddles and jokes
6. Report on local milk plant and supply based on visits to the farm, the factory, and the dealer
7. First-aid demonstration
8. Recent science news
9. Adjournment

The following is a series of programs, each consuming forty-five minutes, given in a club of about one hundred members in a very large high school.

"Chemical Magic" (Experiments)

"Heroes of Science" (Lecture)

"How a Science Book Is Written and Published" (An illustrated lecture of material, manuscript, plates, photographs, cuts, and so forth gathered for a science book. The lecture was given by Ernest E. Burns, the author of the book—*Electricity—A Study of First Principles*)

"The Einstein Theory" (Lecture)

"How Electric Light Bulbs Are Made" (Slides and lecture)

"A Demonstration of the Short Wave Radio"

"How to Develop Your Own Pictures" (Demonstration)

Chemical experiments performed from the club Chemcraft set

Activities other than those at meetings. The chief activities reported, in addition to those carried on at meetings, are trips of various sorts and the preparation of exhibits. The trips made are usually to nearby industrial plants, to natural features, and to similar points of interest. Among the places mentioned are: power plants, city water systems, electric score boards at ball fields, telephone exchanges, ice-cream plants, museums, observatories, stone quarries, sand dunes, flower shows, lectures, museums, excavations, and so forth. Exhibits are sometimes prepared for the clubs alone, sometimes for whole schools or communities, and sometimes for other audiences or purposes, such, for example, as the annual meetings of the State Junior

Academy of Science. Sometimes these exhibits take the form of collections; sometimes they include pictures and posters, scrap and record books, and models of various objects. In other cases they are more general displays intended to describe the work of the clubs as a whole. In a few cases it appears that bulletin boards are maintained permanently, the materials posted being changed from time to time to keep them up to date.

A number of the clubs conduct contests of one sort or another. Thus one reported an attendance contest as a result of which the losing side must entertain the winners; another reported a contest in the collection and posting of certain types of material, the losers again entertaining the winners. In another a somewhat more elaborate contest is carried on. Various items, such as preparation of bulletin board material, preparation of reports, and so on, are scored by the teacher, and each side accumulates points.

As an example of how a contest is conducted the following announcement of a poster contest carried on by a biology club of less than thirty members in a high school of about five hundred pupils is given.

POSTER CONTEST

Because of the very wide spread and wanton destruction of many of our natural resources, the Biology Club is sponsoring a poster contest for the purpose of creating public interest in, and giving information on, the conservation of four of our natural resources: (1) Forests (2) Bird life (3) Native wild flowers (4) Scenery. Posters should be worked out in such a way as to call attention to losses due to destruction of these forms of life, to show how to protect and to preserve them, to depict the good they do us, or to have other suitable themes. Prizes are being offered as an added inducement to students to take part in this attempt to teach these lessons in pictures.

Rules and Information

Eligibility—All high school students (post-graduates excepted) are eligible to enter.

Size of poster—14 x 22. (Regular poster board or other suitable board of correct size.)

Material—Crayons, pencil, or ink may be used.

Number—Each student may enter any number of posters.

Classes—Posters will be judged in three classes: (1) crayon drawings (2) pencil drawings (3) pen drawings. The subjects which may be used are forest conservation, preservation of wild birds, preservation of native wild flowers, and preservation of natural scenery. Other subjects should not be used.

Time—Posters must be turned in to Room 26 on or before March 10.

Your name—Place your name on the *back* of the poster. Do not have any identifying marks on the face of the poster.

Prizes—Three prizes will be awarded in each class, providing ten or more posters are entered in that class. Two prizes will be awarded in each class if five to nine posters are entered in that class. If less than five are entered in any class, only one prize will be awarded in that class. If all nine prizes are awarded, the total cash value of the prizes offered

will amount to more than ten dollars. Among these prizes are subscriptions to suitable magazines, bird books, and flower collections.

Judging—As soon as the entries close and before the judging is done, the prizes will be announced. Three judges will be selected whose names will be announced on the day of judgment. They will make awards on the following basis:

- (1) Artistic arrangement 25%
Is the poster well balanced? Is there color harmony? Is it attractive?
- (2) Neatness 25%
Is it clean? Does it show careful coloring, lettering, and so forth? Did the maker "take pains" with his work?
- (3) Appropriateness 50%
How well does the poster teach the lesson it intends to teach?
Is the lesson obvious? Are the designs and pictures suitable for the subject chosen?

No other activities were reported by more than two or three of the clubs each, but doubtless some are more common than the reports indicated. Among those reported by one or by a very few clubs are: animal shows, flower shows, apple shows, the securing of laboratory material for regular classes, the construction of equipment for regular classes, the entering of contests with other schools, the study and identification of birds, with a system of recognition and awards according to the numbers identified, and the interviewing of city health officers, engineers, and others. A few clubs raise money for particular purposes, such as contributing to the Audubon Society, purchasing museum material, securing a moving-picture machine, and so forth.

It is evident, although many of the letters received did not explicitly state it as a fact, that a considerable number of the clubs make much use of the project method in their work. A few stated that this method alone is employed. The projects are sometimes carried on by entire clubs, sometimes by a group of members, and sometimes by single members. Sometimes they are quite comprehensive, requiring a full year for completion, whereas at other times they are quite small, requiring at most not more than a few hours of work.

Publications. Eight of the clubs reported more or less definite publication of some sort or another, either independent publications issued by the clubs and material prepared by them for insertion in school papers or elsewhere. Since the number of schools engaging in this line of work is small, some attention will be given to just what each is doing, and those that issue their own publications will be named.

The Austin High School of Chicago issues a hectographed periodical, *The Scientist*, which seems to appear about once a month. It contains varying numbers of pages up to at least ten. Among the contents of a single issue are various notes on the program of the club, other matters of club business, miscellaneous current-event items in the field of science, a history of the club, a collection of generally unknown and more or less surprising scientific facts, a brief who's who of the members of the honor club, short biographies of a number of

prominent scientists, several poems, a number of jokes, a few questions and answers concerning the activities of the club, and so forth.

The Fur, Feather and Fin Club of Hyde Park High School of Chicago issues a mimeographed publication, *The Scarab*, that seems usually to consist of four pages and to appear every month. The first page of each issue is chiefly devoted to up-to-date news in the zoological world. The second contains editorials dealing with zoological subjects and with biographies of leading biologists. On the third are to be found miscellaneous interesting items of one sort and another, and on the fourth, news items, short poems, jokes, and miscellaneous material.

The only club in a small school that reported a publication was that at Westville. This is issued as a hectographed publication of four small pages entitled, *Skull and Cross Bones*. It is largely devoted to humorous incidents and selections. An issue of this appears at each of several meetings during the year.

These are the only three clubs that reported anything that might be considered regular publications. One or two others reported the preparation of publications on particular occasions, and the others included in the eight, the preparation of articles for the school paper, usually either a daily or a weekly.

Miscellaneous. A number of clubs reported miscellaneous features that seem hardly to belong under any of the headings previously discussed but yet are worth mentioning. Several mentioned affiliation with the Illinois Junior Academy of Science, and others, that they were looking forward to such affiliation. Undoubtedly some that belong did not state the fact.

Several reported pins or other emblems worn as badges of membership. Since this point was not specifically asked about in the letter of inquiry, it is probable that a number of clubs having such emblems did not report them.

One club reported a formal obligation or pledge which was signed by the charter members when the club was organized. It is likely that others make some use of either written or oral membership pledges or obligations.

CHAPTER IV

SOME GENERAL PRINCIPLES RELATING TO SCIENCE CLUBS

General Statements. The general principles relating to high-school science clubs differ somewhat from those for other high-school clubs. In part, these differences are due to the inherent nature of science subject-matter and to the accessories available for objective presentation, as well as to biological, psychological, and sociological factors applying to the age and experience levels of the club members. It seems advisable, however, to consider some of the more important general principles applying to all high-school clubs together without reference to the differences existing. Examples and applications supporting these principles will, in general, be drawn from science clubs. Somewhat more emphasis will be placed on the details pertaining to the larger rather than to the smaller clubs, on those dealing with science in general rather than with more specialized or restricted purposes, and on complexity of organization rather than extreme simplicity.

Chief among the reasons for this plan of treatment are the five given below.

1. The trend of social life at large has been tending toward greater complexity. Comparative information on this point with specific reference to science clubs appears to support the above statement. A survey of 146 science clubs made in 1928-1929¹ reveals the average membership to be 38.4, the median club having on its roll 29 members, and the median student belonging to a club of 45. A more recent survey² of 152 science clubs made in 1931 indicates an average membership of 43.8, a median club enrollment of 35, and a median student belonging to a club of 56 members.

2. Specialized science clubs, particularly in the schools of average or less than average size, are relatively less common at the present time. For example, in connection with twenty-five chemistry clubs, the high-school enrollment data were as follows: maximum, 5,500; average 3,127; median, 1,575; minimum, 500.³ In contrast with this, in fifty-four science clubs in which chemistry was one of a combination of sciences, the high-school enrollment was: maximum, 5,500; average, 990; median, 720; minimum, 32.⁴ Hence, it appears best not

¹Webb, H. A. "Some First Hand Information Concerning Science Clubs," *School Science and Mathematics*, 29:273-76. March, 1929.

²Astell, L. A. An unpublished study made under the auspices of the Institute of School Experimentation, Teachers College, Columbia University, New York, N. Y., in 1931. This study involved 155 science clubs found at random in 32 states and one territory. Of these clubs, 79 were concerned with the subject of chemistry, of which 25 dealt with chemistry alone. The remaining 54 dealt with chemistry in combination with other sciences.

³*Ibid.*
⁴*Ibid.*

to organize specialized chemistry clubs in schools of less than five hundred pupils, unless the departmental enrollment is above the average or unless the sponsor exercises unusual care to insure the success of the independent club.

3. Specialized science subject clubs, particularly in the schools of average or less than average size, tend to be "short-lived," for the reasons Meister⁵ has ascribed; that prime movers tend to lose others and to exhaust the resources of the instructor. He supplements these points with the statement that if the specialized club succeeds, it becomes an "aristocracy" and continues by saying, "This, of course, is of immense value to the 'aristocrat' but it doesn't at all utilize the possibilities along these lines that the mass of individuals possess."

4. Under the circumstances outlined above, organizations either with or without sections, dealing with science in general are a natural alternative. Such organizations need to be developed as cooperative and participating activities for their memberships. When so designed and conducted, the clubs may serve as a valuable balance to much of the individualized activity unavoidable at other points in our educational scheme.

5. This composite plan will make it easier for sponsors and administrators to select ideas for incorporation in any club designed for maximum service to the membership, school, and community. At the same time, the plan permits condensation in this statement of principles.

The extreme variety of clubs, whether for science in general, general science, a specific science, or for a group of closely related sciences, is due to a number of factors. Among the determinants are: (1) the administrative demands; (2) the sponsor's conception of what constitutes a club, and his personal share in the establishment and furtherance of the activity; (3) the sponsor's peculiar interests; (4) the proportionate enrollments, numbers, natures, and degrees of activity of all other clubs in the school; (5) the total school enrollment; (6) the type of community; and (7) the theories of educational philosophy under which the school operates. The following incomplete classification of science clubs resulted from analyzing more than 150 clubs found at random over the United States:

Astronomy	Chemistry	Aero
Biology—	General Science—	Camera
Botany	for elementary	Motion Picture
Garden	students	Radio
Medical	Geology	X-Ray
Zoology	Physics	

Science in general—not limited to elementary students
Nature

Three science combinations, such as Chemistry, Physics, and Biology

Two science combinations, such as Chemistry and Physics

⁵Meister, Morris. *The Educational Value of Certain After School Materials and Activities in Science*. New York: A. M. Porter and Company, 1921, p. 156-60.

The purposes and virtues of science clubs under these circumstances naturally differ. No attempt will be made at a comprehensive statement on these purposes and virtues. Rather, some of the authoritative and outstanding conceptions will be cited. Thus, the purposes of a science club—whether expressed in the constitution or not—may include the idea of the Chrysalis Club in a commercial school at Atlanta, Georgia, "To make the mentally brightest pupils in the school the most attractive, the most popular, and the most useful."⁶ Clubs make it possible to obtain a progressive education, as Farris has pointed out, by "learning the lessons of life naturally, under friendly guidance, in an environment of freedom suited to the age and capacity."⁷ Under these conditions, attitudes toward science are improved, capacities for enjoyment are enlarged, and the members are better students and citizens for the experience.

Club objectives for 141 science clubs⁸ found at random over the United States may be classified as follows beginning with the most common under each main heading:

Egocentric—	Scientific (<i>continued</i>)—
Interests	Scientific ethics, spirit, appreciation, and attitude
Social (gregarious instinct)	Experiments
Leadership	Projects
Vocational	School and community benefits, including assemblies
Self-expression	Science club and school museums
Self-reliance, initiative	Correlation of science
Avocational	Field trips
Honor student activities	Present and future significance of science
Character building	Research
Citizenship	Scientific methods
Private collections	Adult education
Scientific—	Scientific library
Supplementary and factual information	Publishing science magazine
Modern applications, current science, and so forth	

These objectives were mentioned a total of 347 times. Of the total number, the first three egocentric objectives and the first six scientific ones were named a total of 287 times.

Some of the values ascribed to club work have not been validated by objective information. By nature, the work of the club is less tangible with reference to measurement than that of the classroom. This may account, in part, for the relative scarcity of workers and results in the field of the club activity. In some instances, club work has been of such obviously slight value that administrators have substituted types of home-room programs for club programs. Frequently, the home-room activities fail to consider science.

From another point of view, a recent survey⁹ involving 231 high

⁶Pierce, Lillian. "Our Chrysalis Club," *School and Society*, 34:231-32. August 15, 1931.

⁷Farris, L. P. "Training Through Club Activities," *Junior-Senior High-School Clearing House*, 5:419-21, March, 1931.

⁸Astell, *op. cit.*

⁹Russell, R. D. "What Benefits Do Pupils Derive from School Clubs," *Nation's Schools*, 7:35-40, March, 1931.

schools in Idaho, Montana, Oregon, and Washington shows that there is less administrative endorsement for subject-centered clubs, as conducted at present, than for other types of clubs. This evidence cannot be considered applicable or valid in the several states where junior academies of science¹⁰ have been or are being established. They add incentives and opportunities for science club work and should serve as a valuable source for data to compare with the results obtained in the northwestern states. Through the agency of these junior academies and the resulting activities, it is possible that science club work may be reconsidered in some of those scattered systems where necessary provisions do not exist at present. Extra-curricular authorities other than administrators rather generally appear to favor the club work growing out of the classroom.

Administration. In *The Psychology of High-School Discipline*, Pringle says,

If properly managed, social activities provide a safe channel for adolescent impulses, give skill in the interpretation of social situations, furnish training in leadership, help form right attitudes and habits of cooperation, aid in developing the intellect, supply a motive for loyalty, create a moral atmosphere, and give a real satisfaction and joy.¹¹

Such results must be recognized as extremely valuable in any educational scheme. The extent to which science clubs are social determines the amount of these results therefrom. But the most significant thing about the statement is that all of these benefits result from proper management. This management and the responsibility for clubs has its beginning with the superintendent and principal. If, as in some cases, the supervisor of extra-curricular activities is "to the social activities of the school what the principal is to the academic activities,"¹² this responsibility is less direct, but still effective.

Substitution of worth while activities for undesirable ones may be an important matter in given locations. Many states, as in the case of Illinois, have specific legislation directed against high-school secret orders, gangs, and other organizations tending toward the criminal. It is a matter of general information in police circles that one of the most effective ways of breaking up youthful gangs is through the organization of worth while clubs. A more desirable plan, and one which should be recognized by educators at large, is to maintain effective clubs as a preventive measure. With every facility at hand for such preventive work, a well developed club program can be carried on at a minimum if not a negligible cost.

Although the control of finances for such clubs, as well as for other extra-curricular activities, properly belongs in the hands of the

¹⁰Junior academies of science are composed of affiliated high-school science clubs on a state-wide basis and under the auspices of the senior academies of science.

¹¹Pringle, R. W. *The Psychology of High-School Discipline*, New York: D. C. Heath and Company, 1931, p. 231.

¹²Wilds, E. H. "The Supervision of Extra-Curricular Activities," *School Review*, 25:659-73, November, 1917.

administration, the matter should not rest there. If these organizations are worth while in themselves they should not have to bear a greater stigma of dependence than is necessary. Financial independence of student organizations can be an important consideration in the training of these same students. In too many instances school life resolves itself into a training for spending rather than for evaluating; for speculation rather than for investment. Out of such participating and cooperative education as can be given here, there may be found a partial means of establishing a better economic order.

The sponsor is generally the most vital factor in the welfare of the club. Two of three science clubs, organized and affiliated with the Illinois State Academy of Science by one sponsor, failed because the succeeding teacher was not trained and interested in, nor required to continue the work of, the science clubs. In the third case, the administrator, on the demonstration of results born of experience with the other clubs, required that the succeeding teacher be qualified and ready to continue the work of the club. That third club is now in its second year of healthy, desirable activity following the change of sponsors.

Supervision. Worthy of a place among any list of authoritative statements on the supervision of science clubs, or the relation of the sponsor to the club, is the following by Meister:¹³

The success of the club is of course more dependent upon the director than upon any other one factor. The director should take no active part during the meeting, except when it is necessary to carry the boys over what is to them an insurmountable difficulty. . . . His frame of mind should be that of a man behind the scenes, who having set the stage stands by watching the performance, ever ready to step into a situation and set things right. The ability to do this properly comes from practice. It does not demand exceptional ability or personality.

Confirmation of the idea just expressed may be found in the fact that in over two years the sponsor of one Illinois science club did not appear on any program, except to introduce an occasional adult speaker, or to thank large public audiences for their attendance. Nevertheless, the sponsor bore, in a very large and definite measure, the responsibility of the direction and extent of the club activities. These activities were based on and included: (1) surveys of the interests and aptitudes of the individual members; (2) the sponsor's intimate knowledge of these interests and aptitudes; (3) the desires of the membership revealed through votes at the business meetings; (4) correlations between the various academic departments and extra-curricular activities extending from the junior throughout the senior high school; (5) entertainment of other science clubs in the neighboring schools; (6) judicious integration of recent applications of science not covered by texts and frequently supported by films, slides, and other devices; (7) benefit programs; (8) desirable programs for

¹³Meister, *op. cit.*

certain adult and civic organizations in the community; and (9) participation in the annual state meetings of the Junior Academy of Science.

These activities resulted in business meetings, which became genuinely interesting experiences to the members rather than boring periods devoted to the empty form of reading, or deferring the reading, of minutes which contained nothing of a motivating character. The well organized business meeting in an activated program of club work, operating on the two or three fundamental types of motions, general rules of the floor, courtesy, and team-work, can become an educational force of value. A short monthly business meeting of this sort will care for the ordinary needs of a fairly large club.

In many cases, heretofore, the sponsor's conception of what a science club should be has had to depend on other juvenile organizations in and out of school. Timidity resulting from a lack of helpful information has contributed to make the rôle of the sponsor indefinite in the mind of either the sponsor or the administrator. Uninterested sponsors in some cases have developed the idea of "hands entirely off" these activities "rightfully belonging to the students." Those who champion this idea must somehow believe in man's ability to lift himself by his own bootstraps.

Clubs can succeed in anything like their fullest measure only when they are adapted to aptitudes, arouse common interests, and provide for an active cooperative participation leading out from the club into the activities of the school, community, state, and nation. Behind every phase of the activity from the business meeting to the assembly and public program, the sponsor's leadership and information is a vitally important matter.

Organization. Before actual work is undertaken, administrative approval for the idea of establishing a club should always be obtained. If the administration is merely uninformed as to the possibilities of such a club, selected literature may well be presented for its consideration. It is better to have the voluntary request for the activity originate with the administration than with the prospective sponsor. Time, patience, diplomacy, and constructive salesmanship are as valuable in securing administrative decisions as in obtaining members for the club. In presenting plans for administrative approval, the sponsor should take into consideration the status of the school system. Recommendations for reasonable changes to accommodate proposed plans should be accompanied by pertinent, factual information whenever possible.

Preliminary to the initial organization meetings, the sponsor should have developed and assembled materials in detail on the subject. From this material, interested students under the direction of the prospective sponsor, may, if a democratic organization is contemplated, originate a series of advance bulletin-board notices, cam-

paign posters, and membership thermometers. A volunteer membership committee representing the various classes should be obtained and acquainted with such administrative limitations as scholarship or citizenship grades, and so forth. Relatively high standards of scholarship are frequently made prerequisite to membership rather than to office holding in clubs. In eliminating pupils of low—not necessarily failing—scholastic standing, opportunities may be lost to stimulate and guide pupils to do better work. Some of our eminent scientists, doubtless, would have failed to meet uniformly high scholastic requirements, when as a matter of fact any club if still existent would be proud to claim the name it had once declined. Again, desirable followers and workers necessary to the welfare of any organization may be eliminated on high scholastic requirements. Finally, some students with native leadership qualities can be interested and thus prevented from establishing troublesome cliques through the substitution of an organization obviously more worth while than anything students alone might create. No forward movement can completely and continuously ignore a natural majority of common mentalities.

At the opposite extreme, some teachers are inclined to draft the entire class or classes of one or more sciences into what they choose to call a club. Reflection will serve to indicate that instead of a club, such an organization more nearly approaches a socialized class, but the respective merits of the club and the socialized class are not a matter for discussion here. Under the name of a club, should such an organization enforce attendance to any great extent, we would have what one writer has termed, "hardly more than a slap at personal freedom."¹⁴ If the appeal is great enough, enforced attendance will not be necessary.

Another important matter is the name selected for the club and the slogan used to perpetuate the activity. Too little attention is devoted to this question. In Overstreet's discussion on "Making Ideas Stick," he says, "To be able to devise a name or phrase that will stick, is to have a way of entry into the mind that is swift and sure."¹⁵ The common use of the local school name in connection with the words "science club" is usually ineffective, because such names ordinarily do not involve the spirit and methods of science. These latter qualities are probably most readily conveyed in club names through the names of eminent scientists, but this is by no means the only way. Here, for example, are the names of some science clubs that appear to "stick." These names are attractive without being showy:

The B. S. Hopkins Club (chemistry and physics)

The Benzene Ring (chemistry)

¹⁴Houston, G. D. "Extra-Curriculum Activities in Their True Light," *Education*, 50:289-90, January, 1930.

¹⁵Overstreet, H. A. *Influencing Human Behavior*, New York: W. W. Norton, 1925, Chapter VII.

The Chem-Phyb-i-o (biology, chemistry and physics)
 The Edisonian Science Club (science in general)
 Field and Stream (astronomy, geology, and biology)
 Hunters of the Magic Eye (camera)
 Louis Agassiz Biology Club
 Modern Alchemists (chemistry)
 The Star and Atom Club (astronomy, etc.)
 The Stellars (astronomy and geology)

The size of the club constitutes a problem with many angles. Memberships tending toward larger rather than smaller numbers are satisfactory provided the following conditions are fulfilled:

1. The general administrative plans for clubs should not interfere with each other. The element of time available enters into the question here and at other points. The work of Sturtevant and Strang¹⁶ may serve as a background for establishing objectives in the matter of time. Just as thirty minutes should represent an ample time for a business meeting, so an hour to an hour and a half should be adequate for the absorptive powers of the members. Reductions in time used may be made with niceties of program organization. If the period of time for the regular program is reduced to forty minutes or less, it means modification and reduction of such general plans as are suggested here.

2. There should be a maximum age and an experience range of three or four scholastic years. In combination junior-senior high schools, junior and senior divisions are likely to be desirable. In the larger schools, divisions based on subject-matter represent probable courses. No matter how large the school, there should be joint meetings of all science clubs or sections, as well as occasional meetings for other clubs and extra-curricular activities in the school. Only in cases of special schools for boys and girls does it seem justifiable to base the club or section membership wholly or in part on sex.

3. The available and assigned rooms should be able to accommodate the total enrollment.

4. A large proportion of the membership should serve more or less continuously as officers, committee members, and otherwise.

5. A large proportion of the membership should have opportunities to participate in the programs and other activities. This means the use of group activities, such as short science plays, pageants, special games, and various forms of humor, as well as appropriate music in various forms.

6. There should be occasional selected programs for civic organizations and science clubs from other schools.

7. Vacation and year-around projects of civic and scientific-training value should be included in the program of activities of each club.

¹⁶Sturtevant, S. M. and Strang, Ruth. "Activities of High-School Girls," *Teachers College Record*, 30:562-71, March, 1929.

8. Contests terminating in annual state-wide competitions should be promoted.

9. State programs of consequence in which representative club members as delegates participate should be promoted.

In other words, the larger the organization the more complex and diverse should the activities become. More care must be taken, under these circumstances, that programs satisfy well-defined cross sections of interest. Through posters, advance bulletin board announcements attractively written, and other devices, interest may be created or converted from latent to active form. The presentation of general and sectional programs should be adapted to circumstances. Added significance is obtained by having the initiation program for an Edisonian Science Club on an implied anniversary, a program on "Science and the Polar Regions" at the time of some fresh polar achievement, and a program or other activity on astronomy at the time of some astronomical phenomenon. "Next to efficient leadership," says Meister, "the successful club depends upon its program. In a sense," he adds, "a well-organized program can make up for inexperience or poor leadership."¹⁷

The organization of a science club toward the end, rather than near the beginning, of the academic year offers certain advantages. Under the former circumstance, the sponsor has time in which to develop details based on a more intimate knowledge of the prospective members, the school system, and the community. Such a plan implies that officers representing the various classes, excepting those from the incoming class, be elected at the end of the year. Continuation of this practice is a safeguard against immediate disintegration in the event that any teacher assigned as a sponsor is not genuinely interested or is otherwise unable to render a maximum service to the club. Such a condition arose in an Illinois club several years ago. Because the club had all its officers, with one exception, the organization functioned in the absence of sponsor cooperation to the extent of presenting a benefit program and purchasing a much-needed piano for the school from the proceeds.

From the administrative requirements as to membership standards to submission of rosters of elected officers for administrative approval, every item bearing upon administration should be incorporated in the constitution. Necessary forms implied by the constitution should be made and used. Club members should be given the opportunity to realize and enjoy the majesty of constituted authority without verbiage and other wastes of time and energy which result from an over-emphasis or a wrong emphasis on such authority. The emphasis belongs on action and results if genuine and lasting interest is to be obtained.

¹⁷Meister, *op. cit.*

Adequate forms minimize the personal significance of the offices as such, reduce the errors in procedure, and enhance the results.

The following constitution¹⁸ for a science club is merely a skeleton outline. In order to meet the needs of any individual club, suggestions obtained from the remainder of this bulletin and from other sources which appear practical in the light of the situation, should be incorporated. This skeleton outline has been included because state workers receive so many requests for copies of constitutions.

CONSTITUTION FOR _____ SCIENCE CLUB

Article I. Name

This organization shall be called the
Science Club of the High School.

Article II. Purpose

Section 1. Any regularly enrolled student in the.....
High School who is especially interested in science shall be eligible for membership.

Section 2. Eligible students shall be proposed for membership by a membership committee, which shall consist of the science teachers of the school, and an equal number of students, the latter to be elected by the club. The names of the students thus proposed shall be voted on by the members of the club. A majority affirmative vote of all members shall be sufficient to elect.

Section 3. All teachers of the school who are teaching any science courses shall be members of the club without election, and shall have all the rights and privileges of student members, except that they may not serve as delegates to the meetings of the State Junior Academy of Science.

Section 4. Student members shall pay semester dues of cents.

Article III. Officers

Section 1. The officers of the organization shall be a president, a vice-president, a secretary, and a treasurer.

Section 2. These officers shall perform the duties usually falling to such officers, and together with the teacher members of the club shall constitute the program committee to arrange the program of the club.

Section 3. The officers shall hold office during one semester, and until their successors are elected and installed. Officers for any semester shall be elected at the last regular meeting of the preceding semester.

Article IV. Meetings

Section 1. Regular meetings shall be held on the.....
(afternoon or evening) of each month during the school year. Special meetings may be called by the president at any time, providing the administrative requirements of the school have been met.

Section 2. At least one open meeting shall be held during each year, to which all the people of the community shall be invited. The program of this meeting shall consist partly of an address by some prominent scientist upon a scientific topic.

Section 3. Some meetings in the fall and spring may take the form of picnics in the woods, where some matters of scientific interest may be presented by members of the club or by other members of the community.

¹⁸With slight modifications, this constitution appeared in a pamphlet entitled, "A Message to High-School Science Teachers and Students of Illinois from the Committee on High-School Science and Clubs," widely circulated throughout the Illinois schools several years ago.

Article V. Relation to the (State) Junior Academy of Science

Section 1. This club shall maintain its affiliation with the (State) Junior Academy of Science.

Section 2. Each year the club shall send and defray, as far as possible, the expenses of at least one student club member as a delegate to the annual meeting of the (State) Junior Academy of Science. Such delegate shall be elected by the club, and on return shall give a full report of the meeting to the club. At the option of the club, this meeting may be open to all the students of the school.

Section 3. The copy of the published *Transactions* of the Academy which the club shall receive shall remain the property of the club, but if acceptable shall be deposited in the library of the school.

Article VI. Amendments

This constitution may be amended by a two-thirds vote of the members present at any regular meeting, provided the amendment has been presented in writing at some previous meeting.

Programs and other activities. In various ways, the discussion prior to this point has suggested programs that are dynamic and creative of interest. The bibliography contains a number of references to types of programs which, with slight modifications, may be of genuine service. One of the keynotes in the development of any series of programs is variety. The schedule of regular business meeting periods, activity periods, assembly programs, closed meetings, and other programs should be made at the beginning of the school year, and precautions taken by the administration to insure that this schedule is not broken. Such a plan makes it possible for the sponsor to book slides and films months in advance, to obtain special talent, to correlate the work of the science club with other activities in the school, and to integrate the work with the science subject or subjects offered, as well as to develop information on sciences not even offered. The program committee should develop the program outline and post it at the earliest moment. Detailed announcements should be made as the time approaches. This regularity helps to maintain attendance, since the students, realizing that changes are unlikely, will govern their plans by the schedule. Insofar as the educative process involves the matter of living in real life situations and at the same time preparing for other life situations in the future, this precision is another worth while value to be added to those already ascribed to club work.

CHAPTER V

ANNOTATED BIBLIOGRAPHY

The following bibliography dealing with the work of science clubs is composed of two chief types of references. One includes those that deal rather directly with science clubs, whereas the other includes those dealing in a more general way with extra-curricular activities, but having some bearing upon science clubs that appears to justify their inclusion. The attempt has been made to include all available references of the former type, and a selected list of the more general ones. The references included are briefly annotated, except that a few which were given in bibliographies examined but could not themselves be found, are listed without annotations.

Although the materials examined in the preparation of this bibliography cannot be said to include all sources in which pertinent articles may be found, the writers believe that comparatively few articles of any real worth have been omitted. The libraries exhaustively searched for material are those at the Northern Illinois State Teachers College, the University of Illinois and the University of Chicago, the Chicago Public Library and the John Crerar Library of Chicago. In addition, some references were obtained from sources at Columbia University. The time covered is approximately to the close of 1931.

Immediately following the bibliography is an index which gives the numbers of the references classified under each of several heads. In general references have been listed under only one head, but in a number of cases, especially those of some of the longer and more comprehensive references, they have been listed under two or more of the heads given.

1. **Allen, C. F.** "Criteria for Judging School Clubs." Junior-Senior High School Clearing House, 5:386-87, March, 1931.

Twenty-two specific points for rating clubs upon two general criteria: (1) the service the club program renders to the school, and (2) the service the club renders to the pupil.

2. **Allen, C. F.** "Initiating a School Club Program." Junior-Senior High School Clearing House, 5:389-94, March, 1931.

This includes an outline of specific points under the following general heads: preliminary requirements, club's first meetings, dangers to be avoided.

3. **Allen, C. F.** Outlines in Extra-Curricular Activities. Little Rock, Arkansas: Little Rock High School Print Shop, 1924, p. 44-50, 150.

The chief matters of interest dealt with are club characteristics, objectives, organization, and administration; general suggestions and programs for radio club; and a series of committee reports outlining in detail procedures and content materials for a variety of extra-curricular as well as curricular activities.

4. **Amateur Astronomer.** New York: Amateur Astronomers Association, American Museum of Natural History.

The official organ of the Amateur Astronomers Association.

5. **Anderson, E. W.** "Extra-Curriculum Duties," *Educational Research Bulletin* (Ohio State University), 8:315-17, October 9, 1929.

A study of problems of scheduling, control, and supervision.

6. **Andress, J. M.** "Posture Through the Ages," *Hygeia*, 7:728-29, July, 1929.

A one-act play for junior high-school students. One pupil speaks the lines, and the remainder of the cast in costume demonstrate to music.

7. **Andrews, A. M.** "Systematic Handling of the School Funds with Student Cooperation," *High School Conference Proceedings*, 1922. Urbana: University of Illinois, 1923, p. 160-61.

The method of handling school funds in the Dundee, Illinois, High School, in which the organizations of the elementary and high schools, as well as the individual students, have accounts in the school bank.

8. **Anning, Norman.** "Socrates Teaches Mathematics," *School Science and Mathematics*, 23:581-84, June, 1923.

A short one-act play. Eight or more characters, including Socrates, discuss the origin and development of certain algebraic formulae.

9. **Arnold, H. J.** "The Science Club in the Junior High School," *Junior-Senior High School Clearing House*, 4:470-75, April, 1930.

A narrative account of a meeting of the Science Club in the Lincoln School of Teachers College, Columbia University. Includes a copy of the club's constitution.

10. **Astell, L. A.** "Fostering Science Clubs in the High School," *Journal of Chemical Education*, 6:496-501, March, 1929.

This lists and discusses ten things a science club can do. It also describes briefly the activities of three Illinois clubs in these respects.

11. **Astell, L. A.** "High School Science Club Affiliations with the Illinois State Academy of Science," *Illinois Junior Science*, February, 1932, p. 1-4.

A history.

12. **Astell, L. A.** "How State Academies of Science May Encourage Scientific Endeavor among High School Students," *Science*, 71:445-49, May 2, 1930.

Presents four aspects of the problem of encouraging scientific endeavor among high-school students.

13. **Astell, L. A.** "Initiation Ceremony of the Edisonian Science Club," *School Science and Mathematics*, 28:771-74, October, 1928.

Suggests an initiation ceremony to be used in connection with a science club. Gives in detail the procedure to be followed.

14. **Astell, L. A.** "The Inspiration Which the Illinois Junior Academy of Science Has Brought to the High School Science Clubs in the State of Illinois," *Proceedings of the Indiana Academy of Science*, Volume 41. Indianapolis: Indiana Academy of Science, 1931.

An abstract of paper presented to the Indiana Junior Academy of Science at its first annual meeting.

15. **Astell, L. A.** "An Integrated Project on Copper Utilizing Visual Aids in Various Forms." *Educational Screen*, 11:21-25, January, 1932.

This project may be used for a special study of a base metal in a chemistry club. The outline is sufficiently long and detailed to admit of a wide variety of shorter treatments of the subject.

16. **Astell, L. A.** "Program, Edisonian Science Club." *School Science and Mathematics*, 29:332, March, 1929.

An example of a symposium type of program presented by the above club in the West Chicago Community High School, West Chicago.

17. **Astell, L. A.** "A Ritual and Other Devices for High School Science Clubs." *School Science and Mathematics*, 27:952-55, December, 1927.

This considers science clubs affiliated with the Illinois State Academy of Science and suggests a standardized club pin, standardized cards of membership, credentials for individuals, and a standardized ritual to include illustrative material.

18. **Astell, L. A.** An unpublished study of science clubs made under the auspices of the Institute of School Experimentation. New York: Teachers College, Columbia University, 1931.

This study involves 155 science clubs found at random in 32 states and one territory. Of these clubs 79 were concerned with the subject of chemistry, 25 per cent of which dealt with chemistry alone, and the remaining 54 in combination with other sciences.

19. **Astell, L. A. and McEvoy, S. A.** "Report of the Committee on High-School Science Clubs." *Transactions of the Illinois State Academy of Science*, Vol. 23, No. 1. Springfield, Illinois: Department of Registration and Education, 1930, p. 25-30.

Reveals progress in the organization of high-school science clubs.

20. **Astronomical Society of the Pacific.** San Francisco, California: C. H. Adams, Merchants Exchange Building, 465 California Street.

This organization offers affiliation privileges to high-school science clubs in the form of "institutional memberships." It issues a bi-monthly leaflet on astronomical subjects which may be purchased at five cents a copy. These pamphlets are maintained at a high scientific standard.

21. **Atkins, H. L.** "An Experiment in a Medium Sized High School to Justify Placing Extra-Curricular Activities on School Time." A thesis submitted for the Master's degree at the University of Colorado. Boulder: University of Colorado, 1929.

The writer considers three phases of the problem: she analyzes expert opinion, rates values and validity, and gives experimental data.

22. **Averill, F. G.** "Something New in High School Clubs," *High School Teacher*, 6:361-62, November, 1930.

An account of a post-graduate (character) club in the Fordson High School at Dearborn, Michigan, with references to science and aeroplane clubs.

23. **Babson, H. C.** "The Financial Support of Clubs," *Junior-Senior High School Clearing House*, 5:407-12, March, 1931.

Includes validating arguments in favor of handling club funds through the school budget, and the necessary forms for doing so.

24. **Bail, P. M.** "Selling Physics and Chemistry." *School Science and Mathematics*, 30:195-97, February, 1930.

This plan whereby a poster campaign is used to increase enrollment in the science department should be found useful for augmenting club enrollments.

25. **Baker, R. A.** "Museum Reactions." *Journal of Chemical Education*, 2:480-86, June, 1925.

Tested museum experiments for use by active clubs and classes.

26. **Barr, A. S.** "The Training of Teachers for the Direction of Extra-Curricular Activities." *Educational Administration and Supervision*, 15:350-55, May, 1929.

The importance and types of training available, evidence that extra-curricular training is not well founded, and an analysis of the attitudes of school officials as to the needs are the chief topics treated.

27. **Bateman, Anne.** "Chemistry Saves the Day," *Journal of Chemical Education*, 7:164-66, January, 1930.

A one-act playlet for seven characters, appropriate for general-science clubs, chemistry clubs, or clubs dealing with science in general.

28. **Bawden, A. T.** "A Chemical Party," *Journal of Chemical Education*, 4:86-95, January, 1927.

Various contests and stunts, as well as a thirty-minute play.

29. **Beery, P. G.** "The First-Year Chemistry Course," *Journal of Chemical Education*, 8:1781-816, September, 1931.

A carefully compiled outline correlating visual aids and club activities with classroom work. Sources and references make this article invaluable.

30. **Bell, F. L.** "A Chemistry Exhibit," *Journal of Chemical Education*, 5:280-90, March, 1928.

This contains details of work in the high school at Ridgewood, New Jersey, with a source list of firms issuing industrial exhibits and material.

31. **Bell, F. L.** "Posters in Chemistry," *Journal of Chemical Education*, 5:157-67, February, 1928.

The relation of chemistry to everyday life is illustrated and described in detail.

32. **Bellingrath, G. C.** "Qualities Associated with Leadership in Extra-Curricular Activities of the High School," *Teachers College, Columbia University, Contributions to Education No. 399*. New York: Bureau of Publications, Teachers College, Columbia University, 1930. 57 p.

Among boy leaders a positive relation was found between leadership and age and home background. Ambition to continue their education was the only school attitude which elected leaders possessed that those who were not leaders did not have. Girl leaders differed markedly from non-leaders. They were younger, taller, heavier, and came from better homes. Two of the twenty-six clubs involved in this study are biology and radio clubs.

33. **Bellis, Berton.** "I Am a Chemist," *General Science Quarterly*, 9:89-90, January, 1925.

A monologue, suitable for a special number in a program concerning alchemy, chemistry, and so forth.

34. **Benson, O. H.** "Boys' and Girls' Club Work; Its Principles, Policies, and Requirements," *Journal of Education*, 83:11-12, January 6, 1916.

An address at a conference of county agricultural agents in St. Louis on the merits of the organized and definite form of boys' and girls' club work in agriculture and home economics as operating at that time.

35. **Bergen, R. C.** "Chemistry on the High School Stage," *Journal of Chemical Education*, 6: 963-65, May, 1929.

Instructions for the experiments which are spectacular, easy to perform, require very little apparatus, no gas burner, and which, because of their showy nature and simplicity, are well adapted for the stage.

36. **Billinger, R. D.** "Illustrating the Black Art," *Journal of Chemical Education*, 3:897-902, August, 1926.

Illustrated, suggested, and detailed methods for a demonstration of alchemy.

37. **Billinger, R. D.** "A Night in Alchemy," *Journal of Chemical Education*, 5:715-24, June, 1928. Also *Chemistry Leaflet*, 4:22-29, March 19, 1931.

This combination of acting and chemical tricks requires three characters and additional off-stage assistance.

38. **Biology Club.** Chicago: General Biological Supply House, Inc., 761-63 East 69th Place.

This bulletin, which is issued free, briefly, but in a practical way, considers formal organization, general suggestions, subjects for discussion, and projects.

39. **Bjornson, J. S.** "Student Activities in High Schools," *Journal of Education*, 83:619-21, June 8, 1916.

The reasons for socialization through student activities, educational value of athletic clubs, among others, and a brief general plan for the limitation and direction of student activities compose this article.

40. **Blackburn, Lura.** *Our High School Clubs.* New York: Macmillan Company, 1928. 253 p.

Among the chapters most helpful are those on faculty sponsorship, radio clubs, geography clubs, and science clubs. Appendices reproduce the constitutions of several clubs.

41. **Blair, E. N.** "Club Study Programs," *Good Housekeeping*, 89:59, 212, 215, September, 1929.

This deals with adult women's work based on carefully selected and recommended books. The technique is suggestive.

42. **Bowman, H. M.** "Syncopated Health Trial," *Hygeia*, 8:944-46, October, 1930. Also, *Texas Outlook*, 14:37-38, November, 1930.

A one-act musical play for eight girls of junior or senior high school.

43. **Branch, H. E.** "The Aims and Opportunities of the Junior Academy in Kansas," *Transactions of the Kansas Academy of Science*, Vol. 34. Topeka: Kansas State Printing Office, 1931, p. 27-32.

This includes the program of meeting, the enrollments of Kansas high schools, the aims and opportunities for the Kansas Junior Academy, and a statement of the developments in other states.

44. **Branch, S. W.** "Science Club: Raleigh, North Carolina." *School Science and Mathematics*, 31:231-32, February, 1931.

The activities of this club in the Broughton High School include outside or adult speakers for the major part of the programs, organization of clubs in the grades, and trips to Washington, D. C. and other places.

45. **Brewington, G. P.** "Lead Trees Grown in Gels." *Journal of Chemical Education*, 6:2228-30, December, 1929.

A description of exhibits made by the science club and chemistry classes in the Golden, Colorado, High School.

46. **Briggs, T. H.** "Extra-Curricular Activities in Junior High Schools." *Educational Administration and Supervision*, 8:1-9, January, 1922.

A committee report defining, stating, and discussing thirteen underlying principles of extra-curricular activities.

47. **Brodell, Alexander.** "Franklin K. Lane High School Post-Graduate Science Club." *Bulletin of High Points*, 12:69-70, September, 1930.

A brief statement about this unusual organization, which serves as an intermediary between adult and high-school science clubs.

48. **Broom, M. E.** "High School Camera Club." *High School Teacher*, 7:27-28, January, 1931.

The writer correlates Foster's thirteen objectives of extra-curricular activities with the activities of the Francis W. Parker School Camera Club of San Diego.

49. **Broughton, M. G. and Eaton, M. E.** "Rushing the Message." *General Science Quarterly*, 12:486-92, March, 1928.

A short play in one act with one stage set. Although designed for boy and girl scouts, it may be adapted to other uses.

50. **Brown, H. C.** "Values of Natural Science." *High School Teacher*, 7:246-47, 272, September, 1931.

A brief discussion of the use and activities of a biology club as one of the aids in obtaining such values.

51. **Brown, R. E.** "Financing High School Organizations." *Educational Review*, 59:153-59, February, 1920.

This tells how to raise and handle money for the student organizations of the school.

52. **Bruner, H. B.** "The Junior High School at Work." *Teachers College, Columbia University, Contributions to Education No. 177*. New York: Bureau of Publications, Teachers College, Columbia University, 1925. 112 p.

An account of junior high-school orientation courses embracing the scheme of these courses, including an activities period for clubs; an outline of some of these courses and pupil activities; and a method of administering both courses and pupil activities.

53. **Bush, Ethel.** "Organizing the Biology Class into a Nature Study Club." *Science Education*, 15:48-53, November, 1930.

The laboratory and field plan used in the Phillips High School, Birmingham, Alabama. Three program outlines are included.

54. **Butler, B. D.** "Boys' Clubs and Crime," *Review of Reviews*, 79:74, April, 1929.
Statistical evidence and financial aspects of the problem are presented.
55. **Cady, H. P.** "Liquid Air," *Chemistry Leaflet*, 5:257-71, November, 5, 1931.
A reprint from the *Journal of Chemical Education* in which is given a detailed outline of a liquid-air demonstration suitable for a science-club program.
56. **Carothers, G. N.** "A Science Fair," *Journal of Chemical Education*, 8:244-55, February, 1931.
A well illustrated account of a two-day fair, including fifty-one exhibits in the senior high school at Roswell, New Mexico.
57. **Chaffee, E. T.** *Parliamentary Law*. New York: Thomas Y. Crowell Company, 1930. 124 p.
A well organized and indexed treatment adapted to the elementary needs of high-school science clubs.
58. **Chiddix, J. C. and McEvoy, S. A.** "Chemical Games," *Chemistry Leaflet*, 5:57-58, September 17, 1931.
Suggestions for six novel games to supply spice and variety for programs.
59. **Clippinger, F. E.** "Nature Club Rainbow Honors," *School Science and Mathematics*, 29:652-53, June, 1929.
A detailed credit and award plan suited to the needs of a nature club or to a biology section in a science club.
60. **Clute, W. N.** "The High School Botanical Club," *School Science and Mathematics*, 12:147-49, February, 1912.
This outlines the activities of the Botanical Club in the Joliet High School and presents general program suggestions.
61. **Coates, A. E.** "Scientific Explanations—Sound," *General Science Quarterly*, 12:342-46, November, 1927.
A short play in two acts, and stage sets. Adapted to use by a junior high-school club of average size. A brother and sister are the principal characters, and with them is the remainder of the class.
62. **Cockerell, D. A.** "How Can We Produce Scientific Workers?" *Scientific American*, 134:295, May, 1926.
A suggestive discussion of how incentive material, such as inexpensive books and other items contributing to voluntary beginning interests, may lead to great development.
63. **Coleman, Hugh.** "Extra-Curricular Activities as a Part of the Regular High School Schedule," *High School*, 8:171-73, April, 1931.
The writer urges that there should be provisions for every student, and discusses an expansion program for school clubs.
64. **Collier, Robert.** "Chemistry Club Program," *Chemistry Leaflet*, 4:27, April 23, 1931.
A detailed outline and discussion of the annual "Kemistry Kapers" at the South High School of Denver.

65. **Collier, Robert.** "Methods of Increasing Interest in High School Chemistry," *Journal of Chemical Education*, 7:2141-49, September, 1930.

Factory trips, annual sport trips, outside speakers, chemistry-club programs, and special activities, such as chemical exhibits of an industrial nature, are among the devices used in a Denver high school.

66. **Condon, J. J.** "A Chemistry Club Banquet," *High School Teacher*, 7:67, February, 1931. Also, *School Science and Mathematics*, 31:989-91, November, 1931.

A menu and complete instructions for the two-hour (longest) meeting of the year.

67. **Condon, J. J.** "Chemistry Exhibits in the Small Laboratory," *Journal of Chemical Education*, 7:1649-55, July, 1930.

This includes a list of successful posters. Illustrated.

68. **Conroy, M.** "Giving Children a Worth While Interest," *Playground*, 24:299-300, August, 1930.

Describes the state-wide membership plan used by the Buffalo Museum of Science.

69. **Considine, J. J.** "Activities for Boys Between 15 and 18," *Playground*, 23:249, July, 1929.

A brief statement relative to athletics, arts and crafts, social activities, hiking, and nature clubs in Detroit.

70. **Considine, J. J.** "Miniature Aircraft in Detroit," *Playground*, 24:182, June, 1930.

A report of thirty clubs established at various recreation centers.

71. **Cope, H. F.** "Chemistry Club Work," *Journal of Chemical Education*, 7:1115-17, May, 1930. Also, *Chemistry Leaflet*, 4:24, 28-29, and 28; October 16, 23, and 30, 1930.

An excellent detailed symposium type of program on water, using visual aids and correlated with classroom work beyond the limits of the science department, presented by a club in the Medford, Oregon, High School.

72. **Cox, P. W. L.** *Creative School Control*. Philadelphia: J. B. Lippincott Company, 1927. 320 p.

A presentation of the theory of creative control through clubs and societies, and of the theory of democratic assemblies wherein pupils really express themselves, illustrated by concrete programs.

73. **Craig, Marjorie.** "Club Activities at Roanoke Rapids," *High School Journal*, 7:71-72, March, 1924.

The plan used in the high school of Roanoke Rapids, North Carolina, in which clubs supplanted literary societies.

74. **Crawford, A. E.** "A Little Journey to the Land of Mathematics," *Mathematics Teacher*, 17:336-42, October, 1924.

A three-act play requiring three stage sets and twenty-nine characters. An idea of the importance of mathematics to the world is revealed.

75. **Crowley, J. A.** "The Socialization of the School Program, II. Extra-Curricular Activities," *Journal of Educational Method*, 3:418-26, June, 1924.

A scheme developed in the John Winthrop School of Dorchester, Massachusetts, whereby the teachers select the club members and make the later changes. The following clubs are discussed at some length: wireless, recreation, mathematics, and stereopticon.

76. **Cruttenden, Denman, and Frank, O. D.** "Apple Day, as Observed by a High School Botany Class," *School Science and Mathematics*, 14:217-20, March, 1914.

An excellent program suited to use by science clubs.

77. **Cummings, M. C.** "Philosophical Justification for High School Clubs," *Kansas Teacher*, 32:7-8, February, 1931.

The author sets up the following values for club activities, against those growing out of the seven cardinal principles and the educational philosophy from which they were derived: (1) testing field for educational theories; (2) testing field for curricular development; (3) critical check on administrative procedure; and (4) an environment suited to the development of habits, attitudes, and ideals in and through practice.

78. **Dalthorp, C. J.** "Where Pupils Must Participate in Extra-Curricular Activities," *Nation's Schools*, 7:47-51, April, 1931.

The plan used in the Aberdeen, South Dakota, schools gives every pupil an opportunity to earn school credit for earnest work in outside activities.

79. **Dargan, Jane.** "Organizing a Girls' League in High School," *School and Society*, 33:534-36, April 18, 1931.

A companion article to that of R. H. Mahoney listed below.

80. **Davidson, R. L.** "A Survey of Extra-Curricular Activities in Missouri High Schools," A thesis submitted for the Master's degree at the University of Missouri. Columbia: University of Missouri, 1928.

An analysis of 256 returns from a questionnaire.

81. **Davis, C. O.** "Training for Citizenship in the North Central Association of Secondary Schools," *Fourth Yearbook of the National Association of Secondary School Principals*. Cicero, Illinois: National Association of Secondary School Principals, 1920, p. 45-64.

An analysis of 1180 returns from a questionnaire sent to all accredited secondary schools in the North Central Association territory. Summarized into a twenty-one-point conclusion.

82. **Davis, Doris.** "Assemblies, Festivals, Exhibits, and Other School Activities as Stimulating Growth in Principals and Teachers," *Third Yearbook of the Department of Elementary School Principals*. Lansing: Michigan Education Association, 1929, p. 110-12.

An elementary discussion but with direct application.

83. **Deam, T. M. and Bear, O. M.** *Socializing the Pupil Through Extra-Curricular Activities*. New York: B. H. Sanborn and Company, 1928. 324 p.

Appendix A is a digest of the literature on extra-curricular activities. Includes an annotated bibliography of forty-eight items.

84. **Dee, M. B.** "Objectives and Activities in the Extra-Curricular Field Which Illustrate the Seven Cardinal Principles of Education," *Education*, 49:583-91, June, 1929.

The comparisons between the curricular and the extra-curricular activities are suggestive of how a well-organized program of the latter kind may contribute to the fundamental principles of curricular work. A bibliography on extra-curricular activities is included.

85. **Diwokey, F. F. and Lewis, J. R.** "The Use of Drawings for Stimulating Interest in Laboratory Technique," *Journal of Chemical Education*, 6:1523-24, September, 1929.

Includes material of the "What is wrong in this picture?" type which is suggestive for a program.

86. **Dodd, J. W.** "How Do Pupil Activities in the Junior High School Affect the Later Success of Students in Senior High School and College Life," *Junior High School Clearing House*, 3:34, April, 1929.

Presents four criteria for judging junior high-school activities.

87. **Dodson, N. E.** "What Are the Vocational Possibilities in Extra-Curriculum Activities," *School Review*, 37:767-70, December, 1929.

A brief discussion on science and vocational clubs is included. Suggests that the activities of these clubs should be as closely related to real-life situations as possible.

88. **Dunbar, R. E.** "Chemistry for Fun," *Science Education*, 14:517-18, March, 1930. Also, *Journal of Chemical Education*, 7:1944, August, 1930.

Twelve titles of books and twenty-nine other references which will furnish the teacher and student suitable material for programs in science clubs, assemblies, and similar gatherings.

89. **Dunbar, R. E.** "The Chemistry Open House as an Aid to Instruction," *Journal of Chemical Education*, 5:531-35, May, 1928.

The plans used at the Dakota Wesleyan University are suggestive for club activity.

90. **Dunbar, R. E.** "Wholesome Publicity While You Wait," *School Science and Mathematics*, 29:869-70, November, 1929.

Although this plan for the utilization of publicity is better suited to collegiate activities, it can be modified for use by science clubs of secondary schools.

91. **Dunbar, R. E. and Schafer, Carrie.** "Organization of the High School Science Club, Bibliography," *Journal of Chemical Education*, 7:1327-31, June, 1930.

The authors include eleven points on organization, a suggested constitution, an outline for a program of regular club meetings, twenty-one general program suggestions, sources for insignia and badges, and an extensive bibliography on science-club helps.

92. **Eakeley, F. S.** "Club Activities in the Junior High School," *American Educational Digest*, 45:205-6, January, 1926.

A method whereby pupils make wise choices in club activities.

93. **Eakeley, F. S.** "Formation of Club Activities in the Junior High School," Junior High School Clearing House, 2:1-4, February, 1924.
A plan for organization and administration.
94. **Eastburn, L. A.** "Development of Student Body Organizations," School Executives Magazine, 50:240-42, January, 1931.
Lists organizations in active operation in the Phoenix Union High School, Phoenix, Arizona.
95. **Echols, Silas.** "The Status of Extra-Curricular Activities in Illinois High Schools," Proceedings of the High School Conference, 1921. Urbana: University of Illinois, 1922, p. 45-49.
A brief survey.
96. **Eddy, G. E.** "Training for Leisure in the Junior High," New York State Education, 19:38-40, 94, September-October, 1931.
A description of the plan and activities in the Washington Junior High School, Rochester, New York, which began in February, 1918. Includes a brief comment on a number of clubs.
97. **Ederle, Helen.** "Partial Study of Extra-Curricular Activities in Indiana High Schools in 1929-1930," Teachers College Journal, 2:33-41, November, 1930.
A study based on 149 replies to a questionnaire. The last of the eight general and tentative conclusions is to the effect that every extra-curricular activity should have an educational objective.
98. **Efron, Alexander.** "Exhibits as an Aid in Building Interest in Science," Bulletin of High Points, 13:49-51, May, 1931.
This describes eighteen exhibits of an industrial and classical nature set up in a physical-science department, in which physics and chemistry exhibits were alternated in periods of about three days each.
99. **Ellsworth, E. E.** "The Trial of Johnny Jones," Hygeia, 8:159-61, February, 1930.
A one-act play. Fifty or more junior high-school students demonstrate various physical stunts before "King Joy's Court."
100. **Elking, Esther.** "The Game of Chemists," Journal of Chemical Education, 7:636, March, 1930.
A prize winning chemistry-club game developed on the plan of the well-known game of authors.
101. **Engelhardt, N. L. and Grill, G. W.** "Internal School Accounting for Extra-Curricular Activities in Public Schools," Teachers College Record, 26:753-64, May, 1925.
This centers about the establishment of public confidence in students who handle the money in a way satisfactory to the school.
102. **Evans, E. E.** "The Point System in Extra-Curricular Activities," Junior-Senior High School Clearing House, 5:421-25, March, 1931.
A point system in extra-curricular activities with interlocking features for curricular activities.
103. **Exelby, C. L. and Gambill, L. B.** "Science Club Manual." North Lansing, Michigan: National Club Manual Company, 1931. 92 p.
About ten pages are devoted to a general discussion of science clubs, including suggestions for their organization. Twenty-five program outlines

and sixty suggested topics for programs, together with a short bibliography, constitute the remainder of the booklet. The treatment lends itself to junior high-school work.

104. **Fall, P. H.** "An Annual Chemistry Party," Chemistry Leaflet, 5: 48-55, September 17, 1931.

A suggestive plan used at Hiram College.

105. **Farmer, C. S.** "Camera Clubs," School, 19:423-29, January, 1931.

This considers the phases of camera-club activity in some detail and includes a copy of the rules and regulations for camera-club competition for the secondary schools in and around Toronto.

106. **Farris, L. P.** "Training Through Club Activities," Junior-Senior High School Clearing House, 5:419-21, March, 1931.

A discussion of four objectives of club activities in which it is possible to obtain a progressive education by "learning the lessons of life naturally, under friendly guidance, in an environment of freedom suited to the age and capacity."

107. **Farson, M. E.** "The Cinderella of the Metals," Journal of Chemical Education, 2:57-61, January, 1925.

A play in two acts and stage sets for six girls and three boys. It is based on Group I of the Periodic Table and was originally presented in the Hamilton School of Chicago.

108. **Feldman, L. C.** "Outside of Classroom Activities in Science," School Science and Mathematics, 20:700-6, November, 1920.

Includes data on six agriculture clubs obtained in a survey of thirty-seven Wisconsin schools. No clubs were found which considered science from the academic angle, in the stricter sense.

109. **Feldman, L. C.** "A Science Club in a High School," School Science and Mathematics, 18:54-56, January, 1918.

A suggestive treatment for the organization, supervision, and activities of such a club. Concludes with a list of four general requirements for membership.

110. **Feldman, R. L.** "A Show Window for the Chemistry Department," Journal of Chemical Education, 8:371-72, February, 1931.

An excellent idea for a club activity hinging on the construction of the chemistry rooms.

111. **Ferris, H. J.** Girls' Clubs, Their Organization and Management. New York: E. P. Dutton and Company, 1918. 375 p.

Especial attention is given to the importance of the sponsor. Information particularly applicable to the operation of science clubs may be found.

112. **Fiske, T. P.** "Extra-Curricular Activities," Industrial Arts and Vocational Education, 19:340-41, September, 1930.

This includes a typical outline for a camera or kodak club, among other clubs, as illustrative of nine general considerations. It is quite suggestive from the administrative point of view.

113. **Forsythe and Bowers.** The Plant Wizard. Berkeley, California: University Apparatus Company.

A three-scene tribute to Luther Burbank. Nineteen characters, and groups of dancers. Time, thirty minutes.

114. **Foster, C. R.** *Extra-Curricular Studies in the High School*. Richmond, Virginia: Johnson Publishing Company, 1925, p. 19-21, 27-57, 108-27.

The pages specified include a list of clubs in a Philadelphia junior high school, the writer's conception of typical actually existing clubs, the objectives of science clubs, descriptions of the Senior Nature Club and the Live Wire Club (electrical), the purpose of assemblies, sample programs, and bibliographies.

115. **Fox, M. W.** "The Duchess of Trent." *Hygeia*, 8:846-48, September, 1930.

A play of two short acts with one stage set for eight girls. It may be concluded with drills.

116. **Frank, J. O.** *How to Teach General Science*. Philadelphia: P. Blakiston's Son and Company, 1925, p. 116-18.

The author lists reasons why science clubs fail and discusses briefly eight points in club organization.

117. **Frazier, F. P.** "General Science Club Notes," *School Science and Mathematics*, 31:341-44, March, 1931.

A list of activities suited to a club membership of forty-seven students in the Donald McKay Junior High School, East Boston, Massachusetts.

118. **Fretwell, E. K.** "The Assembly," *Sixth Yearbook of the National Association of Secondary School Principals*. Cicero, Illinois: National Association of Secondary School Principals, 1922, p. 147-54.

Pages on aims of school assemblies and how to realize them have some reference to clubs.

119. **Fretwell, E. K.** "Education for Leadership," *Teachers College Record*, 20:324-52, September, 1919.

Various aspects in detail on the organization for directing certain activities in the Speyer Junior High School of New York City.

120. **Fretwell, E. K.** *Extra-Curricular Activities in Secondary Schools*. Boston: Houghton Mifflin Company, 1931, p. 1-19, 253-95, 444-75.

Discusses a number of topics pertaining to clubs.

121. **Fretwell, E. K.** "Extra-Curricular Activities of the Boys' High Schools," *Report of the Survey of the Public School System of Baltimore, Maryland, Vol. 3*. Baltimore: Public Schools, 1921, p. 101-11.

The writer discusses the organization and administration of these activities, evaluates the work, and offers a constructive program. Information on school clubs is included.

122. **Fretwell, E. K.** "Extra-Curricular Activities of Secondary Schools, A bibliography," *Teachers College Record*, 24:60-72, January, 1923.

An extensive annotated work.

123. **Fretwell, E. K.** "The Place of Extra-Curricular Activities in Education," *School and Society*, 21:633-39, March 14, 1925.

This is an address read before the Harvard Teachers' Association. It considers clubs among other activities and lays down five principles for the former: (1) a constructive policy, (2) growth from classroom, (3) humanizing process open to every teacher, (4) a club for every pupil with sponsor for clubs, (5) stimulation from principals direct to sponsors.

124. **Fretwell, E. K.** "Ten Tests for a School Club," *Junior-Senior High School Clearing House*, 5:387-89, March, 1931.
The tests cited are: (1) common interest, (2) sources of common interest, (3) size of club, (4) active participation, (5) a stepping-up program, (6) satisfaction, (7) pupil membership, (8) club's relation to the school, (9) club's name, (10) club's sponsor.
125. **Froula, V. K.** "Extra-Curricular Activities: Their Relation to the Curricular Work of the School," *National Education Association, Journal of Proceedings and Addresses*, Vol. 53. Washington: National Education Association, 1915, p. 737-42.
A statement of some practices necessary for the organization of such activities, together with an appropriate philosophy.
126. **Gegenheimer, F. C.** "Mathematics Clubs," *School Science and Mathematics*, 16:791-92, December, 1916.
The plan of the Mathematical Society of the Marion, Ohio, High School.
127. **Gere, M. C., et al.** "The High School Chemistry Library," *School Science and Mathematics*, 29:859-63, November, 1929.
A suggestive list for clubs purchasing books for the chemistry library.
128. **Gill, John.** "Extra-Class Room Activities," *Sierra Educational News*, 25:22-24, September, 1929.
This is based on a questionnaire sent to the secondary and the larger elementary schools of San Mateo County, California.
129. **Glenn, E. R. and Walker, Josephine.** "Bibliography of Science Teaching in the Secondary Schools, Lincoln School, Teachers College, Columbia University, New York." *United States Bureau of Education Bulletin*, 1925, No. 13. Washington: Government Printing Office, 1925. 161 p.
A comprehensive collection of information.
130. **Goldsmith, G. B., et al.** "A Burrough's Day Project," *General Science Quarterly*, 6:538-50, May, 1922.
A plan, together with the material, used in the Salem, Massachusetts, State Normal School.
131. **Goodrich, T. V. and Clements, S. L.** "A Comparison of a Group of High School Failures with a Group of Successful Students," *School and Society*, 18:715-20, December 15, 1923.
A minor part of the study considers club memberships in which eighty-eight students belonging to no clubs were unsatisfactory students as compared with forty that were satisfactory. About 43 per cent of the satisfactory group were members of clubs, while only 11 per cent of the unsatisfactory group were members.
132. **Gordon, N. E.** "The Value of a Science Club in Secondary Schools," *School Science and Mathematics*, 17:802-4, December, 1917.
An outline of activities covering ground that must otherwise be neglected.
133. **Gorsline, Robert.** "Home Room Pictures," *High School Teacher*, 6:366-67, 371, November, 1930.
A forceful discussion built on the thesis that the home room can be made and is in some cases the greatest training ground for citizenship and

character in secondary schools. It includes a list of standards for judging home-room sponsors which is applicable for judging club sponsors.

134. **Gosling, T. W.** "Evaluation of Extra-Curricular Activities," *Ohio Schools*, 7:189-90, May, 1929.

An analysis in terms of certain studies reported in the *Sixth Yearbook of the Department of Superintendents*, including a three-point test for extra-curricular activities and a list of challenges for students.

135. **Gow, R. M.** "Service Club," *Education*, 52:147-51, November, 1931.

A thought-provoking statement on policies and plans in which the author indicates the importance of direction through service clubs whose activities extend beyond the school.

136. **Graff, Margaret.** "Euclid Dramatized," *School Science and Mathematics*, 21:381-82, April, 1921.

A brief but suggestive account of the dramatization of some of the stories of early mathematicians by students of the South Philadelphia High School for Girls.

137. **Grimes, J. O.** "An Accounting System for the Extra-Curricular Activities in the Ypsilanti High School," *American Schoolmaster*, 18:294-99, September, 1925.

Describes in detail the accounting system used in the Ypsilanti, Michigan, High School.

138. **Hadley, Theodosia.** "The Relation of Nature Study to Boys' and Girls' Club Work," *Nature Study Review*, 16:54-61, February, 1920.

An outline of the values of such club work, with suggestions as to how nature study may be used in obtaining these values.

139. **Hall, A. L., et al.** "The New Assistant," *Journal of Chemical Education*, 2:600-4, July, 1925.

A one-act play on the advantages of the metric system. Requires a minimum of eight boys and one girl to represent various nations using the system. The stage and costumes needed are simple.

140. **Hanske, C. F.** "A Science Auditorium Program," *School Science and Mathematics*, 30:884-93, November, 1930.

A play, "The Triumph of Science," for twenty-five characters. Time about forty-five minutes.

141. **Hanson, F. W.** "Organizing and Running a Chemistry Club," *Report of the New England Association of Chemistry Teachers*, 31:11-14, September, 1930.

This article deals with organizing and running a chemistry club, and what one gets out of such a club. It discusses the five-year-old Chemistry Club, Wilby High School, Waterbury, Connecticut, in which a parents' night, a christmas social, an alumni night, and an annual banquet are employed to obtain intra- and extra-mural relationships valuable to the club, the school, and the community.

142. **Hanway, H. F.** "Small School Auditorium," *New York State Education*, 18:193-94, October, 1930.

An account of how various clubs, among the activities of the school, make use of the auditorium in the school at East Norwich, New York.

143. **Harding, P. H., et al.** "A Mathematical Victory," *School Science and Mathematics*, 17:475-82, June, 1917.

A play in two acts and four scenes written under the auspices of the

mathematics club of the Los Angeles State Normal School of California. Numerous characters of both sexes.

144. **Hart, F. T.** "Fire Prevention as a Program for General Science, Suggestions for," *School Science and Mathematics*, 25:153-56, February, 1925.

Includes a score card for evaluating the degree of carelessness in the home.

145. **Hartson, L. D.** "Psychology of the Club," A dissertation submitted for the degree of Doctor of Philosophy at Clark University. Worcester, Massachusetts: Clark University.

A study in social psychology. It includes Gulick's classification of interests and activities based on age and other applicable information.

146. **Hathaway, E. V.** *Festival of Indian Corn*. New York: A. S. Barnes and Company, 1930. 22 p.

A historical pageant depicting in verse, dance, and pantomime the settling of the Western plains.

147. **Haub, H. D. F.** "Students' Research Work in High School Chemistry," *Journal of Chemical Education*, 4:1241-59, October, 1927.

Detailed suggestions for work which may be conducted by club members.

148. **Hayes, W. J.** "Recording the Extra-Class Activities of High School Pupils," *School Review*, 39:439-48, June, 1931.

A detailed plan supported by the author's study of voluntary school participation in school activities in which it is developed that the number of memberships may be taken as a crude index of the voluntary participation, but that time is a more refined measure. "Time also measures the differential of participation among members of the same group, leaders or chief actors being differentiated from followers by a relative time consumption."

149. **Hazard, I. W.** "The Diamond Dick Lunch Room," *Chemistry Leaflet*, 4:25, 29; January 29, February 5, 1931.

A play with four characters—a Chinese waiter and three cowboys. It combines novel chemical tricks with a lunch. Time, forty minutes.

150. **Heathcote, D. J.** "Clubs in Junior High Schools," *Michigan Education Journal* 1:213-14, January, 1924.

The writer suggests what clubs should be organized in junior high schools, how they should be organized, when they should meet, and so forth.

151. **Heintz, W. W.** "A Janitor's Life," *Journal of Chemical Education*, 6:1793-96, October, 1929.

A one-act comedy with two characters. The chemical tricks called for must be prepared under experienced supervisor.

152. **Henry, E. G.** *Helps for Club Program Makers*. Chicago: Chicago American Library Association, 1930. 68 p.

Although primarily intended for the use of librarians working with women's clubs, this bibliography will be found helpful in correlating scientific material with other subject-matter. The content includes: club program-making, study clubs, index to material, books included in the index, additional books suggested, periodicals and organizations referred to, and state agencies giving help to women's clubs.

153. **Herriott, M. E.** "Assembly Programs for Class Work," *School Science and Mathematics*, 25:150-52, February, 1925.

An illustrated article for a fake radio program. The principle could be used with other material.

154. **Higburg, William.** "Student Meetings at the Indiana Section of the American Chemical Society," *Journal of Chemical Education*, 8: 1613-17, August, 1931.

This section was instituted in 1922 to acquaint the embryo chemists of the state with industry, particularly that of Indiana, and to give them assistance in finding their proper place in the scheme of chemical development.

155. **Hodges, F. B.** "C. A. C. Camera Club of Oneida, New York," *Photographic Era*, 64:293-99, June, 1930.

An appreciation, and at the same time an outline, of activities of an adult organization worthy of emulation.

156. **Holbeck, E. S.** "Making the Extra Classroom Activities Socially Significant," *Journal of Educational Sociology*, 3:354-58, February, 1930.

This describes the plan used by the junior high school of Passaic, New Jersey. It includes references to camera, radio, and first-aid clubs, among others, which were used to put new life and interest in the school.

157. **Holroyd, G. H.** "First Steps to Freedom: A School Camera Club," *New Era*, 12:31, January, 1931.

158. **Holtzman, Clarence.** "Chief Bughunter," *School Science and Mathematics*, 30:681-83, June, 1930.

A method of training pupils in entomology. Can be used by a science club or section.

159. **Homewood, Boyd.** "Extra-Curricular Activities and Their Supervision," *High School*, 8:203-5, April, 1931.

In this plan the activity director acts as night principal and is in complete charge of the building during all evening functions. He deals with faculty advisers rather than with students. This relief given the principal makes it possible for all work to be done better.

160. **Hosic, J. F.** "How to Integrate Curricular and Extra-Curricular Activities-Abstract," *Official Report of the Department of Superintendence*. Washington: National Education Association, 1931, p. 214.

This is based upon the thesis that the potentially educative school clubs, among other extra-curricular activities, open the way to the cultivation of special interests and aptitudes.

161. **Houston, G. D.** "Extra Curriculum Activities in Their True Light," *Education*, 282-92, January, 1930.

Points out that as far as literature is concerned the values have been assumed rather than proved; that sponsors should be more than mere attendants or spectators and should have a definite program with respect to educational values correlated with the curriculum and serving to help motivate the curriculum subjects; that enforced attendance approaches a slap at personal freedom; that the homeroom offers some distinct advantages; and, finally, that the real service of such activities lies in their educational possibilities rather than in their validity and number.

162. **Howe, F. W.** "Boys and Girls Agricultural Clubs," Farmer's Bulletin, No. 385. Washington: United States Department of Agriculture, 1910. 23 p.
Basic information on the nation-wide organization.
163. **Huffman, Mary.** "A Meeting under Difficulties," Current Science, 9:72, January 19-23, 1931.
An outline of science-club meeting and work in the Michigan School for the Deaf at Flint.
164. **Huggett, A. J.** "Contracting for Extra-Curricular Activities," American School Board Journal, 82:116, June, 1931.
The administrative method used in the Lake Orion, Michigan, schools to avoid inexcusable situations is to specify extra-curricular requirements or duties in teachers' contracts.
165. **Hunter, G. W.** "What a Science Club Can Do for a School," School Science and Mathematics, 23:817-20, December, 1923.
A historical account, covering a twenty-year period, of the development of the Biological Field Club, DeWitt Clinton High School, New York.
166. **Illinois State Academy of Science.** "A Brief History of the Junior Academy of Science," Transactions, Vol. 23, No. 1. Springfield: Department of Registration and Education, 1930, p. 23-24.
Reports the activities of the junior organization.
167. **Illinois State Academy of Science.** "Constitution and By-Laws—Junior Section of the Illinois State Academy of Science," Transactions, Vol. 24, No. 1. Springfield: Department of Registration and Education, 1931, p. 37-38.
168. **Indall, H. A. R.** "Administering School Activities," High School Teacher, 6:76-78, February, 1930.
The plan used in the Highmore schools of South Dakota. Includes a point system in which there appears to be no special emphasis on clubs related to the class-room.
169. **Indiana University, School of Education, Bureau of Cooperative Research.** "Topical Analysis of 234 School Surveys," Bulletin, Vol. 3, No. 4. Bloomington: Indiana University, 1927. 111 p.
Shows what attention school surveys give to clubs and related topics.
170. **Inglis, Alexander.** Principles of Secondary Education. Boston: Houghton Mifflin Company, 1918, p. 715-17.
A brief critical statement on extra-curricular education, with the opposed danger signs.
171. Insignia and badges for clubs may be obtained at a low cost from the following firms:
"Ace" Badge, Button, and Medal Company, 303 Fifth Avenue, New York.
Bastian Brothers, 54 Bastian Building, Rochester, New York.
Dieges and Clust, 15 John street, New York.
Eagle Regalia, 115 Nassau street, New York.
Science Classroom, 381 Fourth Avenue, New York.
Spies Brothers, 27 East Monroe, Chicago, Illinois.

172. **Jacobs, A. H.** "Chemical Posters," *Journal of Chemical Education*, 2:792-94, September, 1925.

The writer suggests the collection of posters for chemical subjects and gives six examples.

173. **Jacobs, A. H.** "Chemistry as Depicted in Art," *Journal of Chemical Education*, 2:111-13, February, 1925.

This is suggestive for clubs making purchases of this sort.

174. **Jacobs, A. H.** "Friendly Fire," *Journal of Chemical Education*, 6:1787-89, October, 1929.

An enlivening supplement for a fire-prevention-week program, including nine experiments, all of which may be done by one person.

175. **Jacobson, C. A.** "A Chemical Spelling Match," *Science*, 56:368-69, September 29, 1922.

A modification of the old-time spelling bee, as staged at West Virginia University. A useful idea for club stunt.

176. **Johnson, F. W.** "The School Organization of the High School," *School Review*, 17:665-80, December, 1909.

A classical account of activities in the University of Chicago High School evolved under the deanship of William Bishop Owen.

177. **Jolly, L. F.** "An Accounting System for High School Organizations," *School Review*, 31:136-42, February, 1923.

This describes an accounting system used in a number of Illinois high schools.

178. **Jones, Gertrude.** "Clubs in High School," *American School Board Journal*, 68:57-58, February, 1924.

This considers the kinds, values, purposes, and management of clubs.

179. **Jones, Gertrude.** "Survey of Extra-Curriculum Activities in High School," *School Review*, 34:734-44, December, 1926.

A survey that includes the extent of participation in clubs in the Lincoln, Nebraska, High School, with suggestions for improvement, eliminations, and additions, educational experience afforded pupils, and the process of perfecting the program.

180. **Jones, Gertrude.** "Systematizing the Financial Affairs of High School Student Organizations," *School and Society*, 15:611-12, June 3, 1922.

A brief description of the finance system used in the Lincoln, Nebraska, High School.

181. **Jones, Gertrude.** "Three Principles Underlying the Administration of Extra-Curricular Activities," *School Review*, 33:510-22, September, 1925.

Of the 2062 pupils enrolled in the high schools of Lincoln, Nebraska, 1967 were members of some high-school club. The writer points out that "substitution of worth-while activities for undesirable ones, and financial control are fundamental."

182. **Jordan, R. H.** *Extra-Classroom Activities in Elementary and Secondary Schools*. New York: T. Y. Crowell Company, 1928, p. 126-45.

The pages mentioned include a general discussion of societies and clubs.

183. **Jordy, L. C.** "All Wet—A Scientific Treatment on Water." Madison, New Jersey: L. C. Jordy, Drew University.
184. **Jordy, L. C.** "Explosives; a Burlesque Lecture," *Journal of Chemical Education*, 7:653-59, March, 1930.
A two-character presentation suitable for the sponsor's personal presentation before a chemistry club of members well advanced in the course.
185. **Jordy, L. C.** "How Times Have Changed! A Playlet in Two Acts," *Journal of Chemical Education*, 8:256-69, February, 1931.
Ben Johnson's longer play, "The Alchemist," revised and brought up to date. It requires nine characters, including one girl.
186. **Judd, C. H.** *Psychology of Secondary Education*. Boston: Ginn and Company, 1927, p. 325-57.
The psychology of natural science is treated in these pages.
187. **Kindy, M. M.** "A Successful Open-House Program," *Journal of Chemical Education*, 8:2046-50, October, 1931.
A plan used in the Franklin High School of Los Angeles. It includes novel modifications of old experiments. One and a quarter hours in length.
188. **Kistler, R. C.** "Selling High School Chemistry to the Community," *Journal of Chemical Education*, 7:1324-46, June, 1930.
A chemistry carnival for arousing student interest in chemistry.
189. **Klein, Paul.** "Extra Class-Room Activities in the Evening High School," *Education*, 51:240-44, December, 1930.
The writer states eight principles relative to general organization, membership, officers, time for meetings, schedule, and finance.
190. **Knapp, J. S.** "Indian Summer in Reading," *Playground and Recreation*, 22:78-82, May, 1928.
Five episodes and four interludes compose the program. An effective method of working with larger groups. Time, one and three-quarters hours.
191. **Koos, L. V.** *The American Secondary Schools*. Boston: Ginn and Company, 1927, p. 583-97.
Allied activities, including the values ascribed, obstacles, types, principles, and practices of organization, administration, and supervision of pupil-participating work are considered.
192. **Koos, L. V., et al.** "Extra-Curricular Activities," *Twenty-Fifth Yearbook of the National Society for the Study of Education*, Part II. Bloomington, Illinois: Public School Publishing Company, 1926, p. 9-22.
Clubs as well as other extra-curricular activities in both junior and senior high schools are dealt with. The discussion includes general principles and practices, as well as accounts of what particular schools do.
193. **Lamar, W. L.** "The Arabian Barber Shop," *Journal of Chemical Education*, 6:2011-18, November, 1929.
A one-act comedy with two characters for presentation under experienced supervision. Some excellent chemical tricks are introduced.
194. **Lamar, W. M.** "The Fraternity Initiation," *Journal of Chemical Education*, 6:2254-59, December, 1929.
A prize winning one-act burlesque for eight characters. This is particularly appropriate for use by a chemistry club.

195. **Lantz, C. W.** "Science Clubs in High Schools," Iowa State Teachers College Extension Division, Science Bulletin, Vol. 4, No. 1. Cedar Falls: Iowa State Teachers College, 1931, p. 1-2.

An outline of activities of the Iowa Junior Academy of Science, the growth of the movement in other states, and the support it has through the national committee on junior academies.

196. **Law, S. D.** "High School Projects in Chemistry," Journal of Chemical Education, 6:1139-43, June, 1929.

An outline of general technique for class work which might be adapted to club activities.

197. **Leonard, J. P.** "Period for Extra-Curriculum Activities and Guidance," Virginia Journal of Education, 24:24-27, September, 1930.

A critical presentation of four fundamental questions on the subject answered on the basis of the seven principles of the newer education.

198. **Lewis, J. A.** "Experience with Science Clubs," School Science and Mathematics, 23:624-29, October, 1923.

The values to be obtained from a well conducted club based on the activities of four science clubs in New Brunswick, New Jersey, are given.

199. **Lieberman, Elias.** "Extra-Curricular Activities in High School," Bulletin of High Points, 11:13-20, November, 1929.

In the Thomas Jefferson High School of New York City these activities are regarded as a part of the mental-hygiene program. Provisions are made for a sufficiently extensive program with proper selectivity, direction, and control.

200. **Logan, J. G.** "Experience with a Science Club," General Science Quarterly, 7:15-18, November, 1922.

A selection of experiences in presenting programs of various sorts.

201. **Lohr, V. C. and Holley, Clifford.** "Differences Between Solids, Liquids, and Gases," School Science and Mathematics, 31:39-40, January, 1931.

A one-act play for three girls.

202. **Lovejoy, P. C.** "Extra Class Activities," High School Teacher, 6:143-44, April, 1930.

A discussion relative to the future when the entire school life will be made up of activities. The arguments are based on the activities program in the Hamtramck, Michigan, schools, where education is aimed at the integration of personality. The article summarizes the schools' *Educational Monograph*, No. 1, on creative teaching to promote the following objectives: growth, initiative, efficiency, reason, and cooperation.

203. **Lunt, J. R.** "The Science of Common Things," General Science Quarterly, 11:169-83, 263-80, March, May, 1927; 12:329-38, 407-12, November, January, 1928.

A series of radio science lessons given in the Big Brother Club hour of WEEI. Could be used in connection with a fake radio idea.

204. **Lunt, J. R. and Haley, D. C.** "Fire Kindling," Science Education, 14:551-55, March, 1930.

Five demonstrations.

205. **Lussenhop, Raymond.** "Organization of a Science Club," *School Science and Mathematics*, 24:727-30, October, 1924.

The club referred to is the Bowen Bird Boosters of the Bowen High School, Chicago, Illinois. Its organization and activities are outlined. The latter are carefully supervised, a factor which helps account for the success of the club.

206. **Lyman, R. L. and Cox, P. W. L.** *Junior High School Practices*. New York: Laidlow Brothers, Inc., 1925. 215 p.

A collection of reprints of articles by a number of authorities on problems of the junior high school, including clubs. Most of these articles are cited separately in this bibliography.

207. **McBride, W. E.** "Stimulating Extra-Curricular Activity," *High School Teacher*, 6:34, January, 1930.

A discussion on major principles, awards, limitations, and results of a program designed for a relatively small school.

208. **McEvoy, S. A.** "A Successful Project Plan in Chemistry," *School Science and Mathematics*, 31:78-79, January, 1931.

The activities of a chemistry class organized as a club are stated briefly.

209. **McGill, M. V.** "A Live Chemistry Club in High School," *Journal of Chemical Education*, 1:31-33, February, 1924.

The writer gives an account of a three-year-old club, including the plan of its monthly field trips, outside speakers, and annual opening meetings, as well as a sample program.

210. **McGill, M. V.** "Open Meeting of the Chemistry Club of Lorain High School," *Journal of Chemical Education*, 2:294-304, April, 1925.

A three-act play with two stage sets. Some relations of the teaching of chemistry to everyday life are shown. From fifteen to thirty or more characters may be used in personifications of some leading chemists.

211. **Mackay, E.** "A Solution of the Literary Society Problem," *North Carolina Teacher*, 1:10-11, September, 1924.

How a club program corrected the situation where high-school literary societies "were dead, and didn't know it."

212. **McKown, H. C.** *Assembly and Auditorium Activities*. New York: Macmillan Company, 1930. 462 p.

McKown's point of view is that the assembly is a whole-school experience in which the entire student body has a part. An entire chapter is devoted to "Science and Mathematics." Another important feature is the Assembly Program Rating Scale.

213. **McKown, H. C.** *Extra-Curricular Activities*. New York: Macmillan Company, 1929, Chapter VI.

This chapter considers the various aspects of club work.

214. **McKown, H. C.** *School Clubs: Their Organization, Administration, Supervision, and Activities*. New York: MacMillan Company, 1929. 498 p.

The portions of this volume of most direct value are probably as follows: objectives of school clubs and basic principles of club organization, p. 1-27; administration and supervision of club programs, p. 28-65; internal organization of clubs, p. 66-83; science and mathematics clubs with

references for club work, p. 200-20; nature-study clubs, p. 221-25; health clubs, p. 361-76.

215. **McKown, H. C.** "Suggestions for Supervising Extra-Curricular Activities," *High School Teacher*, 5:45-47, February, 1929.
Four suggestions are discussed in detail.
216. **McKown, H. C. and Horner, M. B.** "Financial Administration of Extra-Curricular Activities," *Twenty-Fifth Yearbook of the National Society for the Study of Education, Part II*. Bloomington, Illinois: Public School Publishing Company, 1926, p. 111-26.
This includes a study of costs for four hundred schools and gives three types of financial organization.
217. **McNamara, Marie.** "The Organization of an Active Club Program," *Junior-Senior High School Clearing House*, 5:394-98, March, 1931.
This is based on actual experience to the end that the club program of the school serves the individual needs and interests and accomplishes the objectives for which it was instituted.
218. **McSorley, Kathryn.** "Mock Trial of A versus B," *School Science and Mathematics*, 18:611-21, October, 1918.
A clever one-act dramatization, adapted from Stephen Leacock's story, "A. B. C." Sixteen characters, all boys, are needed. The jury represents various branches of mathematics, pure and applied.
219. **Mahoney, R. H.** "The Boys' Club in an Urban High School," *School and Society*, 29:89-92, January, 1929.
An experimental plan used in the Bulkeley High School of Hartford, Connecticut, to supplement student government. The Girls' League co-operates in giving three suppers each semester. The activities are intended to develop enthusiasm for the highest ideals in scholarship, sportsmanship, fellowship, and character.
220. **Maller, J. B.** "Cooperation and Competition; An Experimental Study in Motivation," *Teachers College, Columbia University, Contributions to Education, No. 384*. New York: Bureau of Publications, Teachers College, Columbia University, 1929, Chapter IX.
Club membership as a factor of motivation is discussed. No data for science clubs alone are given.
221. **Marble, A. L.** "An Ideal Club Headquarters," *Photographic Era*, 61:334, December, 1928.
This gives the floor plan for the Camera Kraft Club at the State Teachers College, St. Cloud, Minnesota, and presents pertinent data.
222. **Marshall, J. J.** "Administration of the Funds of School Organizations," *School Review*, 37: 251-52, April, 1929.
A bonded trustee of funds, represented by one of the high-school teachers in the bookkeeping department, is the expedient method used in the high school at Sheridan, Wyoming. This teacher is supplied with special receipts and checks.
223. **Marshall, Josephine.** "Water, Its Composition, Purity, and Impurity," *Science Classroom*, 6:1-6, May, 1929.
A lantern and some apparatus are necessary.

224. **Maurer, J. F.** "Club Activities in the Junior High School," *Industrial Education Magazine*, 32:9, July, 1930.

The clubs in the junior high school of Stamford, Connecticut, are divided into eight categories. Among the industrial-arts clubs are radio, airplane, aeronautics, toy, ship model, and ship improvement organizations. These activities exist to the end that every student may be equipped with a worthy hobby.

225. **Medsker, O. P.** "High School Camera Club," *High School Teacher*, 7:125-26, April 19, 1931.

An account of the history, organization, and activities of the Lincoln High School Camera Club in Jersey City.

226. **Meister, Morris.** *The Educational Value of Certain After School Materials and Activities in Science.* New York: A. M. Porter and Company, 1921. 175 p.

An excellent study. It sets forth a three-point guide for all further attempts in club work: workable materials, definite program, and intelligent leadership. Other significant ideas are that specialized clubs are generally "short-lived," that the success of clubs is more dependent upon sponsors than upon any other one factor, and that there are five general types of activities meriting description: lectures, trips, school assemblies, and so forth.

227. **Meister, Morris.** "Managing a Science Club," *General Science Quarterly*, 7:1-15, November, 1922. Also, in *School Science and Mathematics*, 23:205-17, March, 1923.

An excellent discussion concerned with types of clubs, organization of clubs, program of activities, and an elaborate point system used as the basis of awards. The central conception is that the chief role of the science club is as a vehicle on which promiscuous after-school activities may be carried into the classroom where they may be guided and controlled.

228. **Meister, Morris.** "A Scientific Program for a School Assembly,—Edison," *Science Classroom*, 3:3-4, February, 1924.

A suggestive consideration of the man, his methods, and his work.

229. **Meyer, H. D.** *Handbook of Extra-Curricular Activities in the High School; Especially Adapted to the Needs of the Small High School.* New York: A. S. Barnes and Company, 1926. 402 p.

Includes suggestions for club activities, a list of clubs, and a bibliography.

230. **Meyer, H. D.** *The School Club Program.* New York: A. S. Barnes and Company, 1926. 178 p.

A discussion of the organization, administration, activities, and supplementary agencies, with lists of clubs and a bibliography.

231. **Meyer, H. D. and Eddleman, S. M.** *Financing Extra-Curricular Activities.* New York: A. S. Barnes and Company, 1930. 132 p.

Methods of raising and distributing finances, with four suggested systems given in detail.

232. **Mickel, R. A.** "Interest Activities and What They Mean to the Pupil," *Nation's Schools*, 7:39-43, February, 1931.

The records of the boys at Western Reserve Academy, Hudson, Ohio, exemplifying how a proper balance between the "co-curricular" projects

and the academic program vitalizes school life. The Natural History Club and the Astronomy Club receive attention.

233. **Millard, C. V.** *The Organization and Administration of Extra-Curricular Activities.* New York: A. S. Barnes and Company, 1930. 145 p.
 Considers definitions, classifications, and principles involved. An extra-curricular library text.
234. **Miller, D. W.** "Suggested Programs for a Science Club," *Science Education*, 14:331-34, November, 1929.
 An outline of programs for a year's work, and other suggestions.
235. **Miller, H. L. and Hargreaves, R. T.** "Semi-Curricular and Extra-Curricular Activities," *The Self-Directed School.* New York: Charles Scribner's Sons, 1925, Chapter VII.
 The most helpful portions are two department assembly programs: One involves four experiments necessitating some special apparatus.
236. **Monroe, Mack.** "Clubs in the Barbour Intermediate School, Detroit, Michigan," *Twenty-Fifth Yearbook of the National Society for the Study of Education, Part II.* Bloomington, Illinois: Public School Publishing Company, 1926. p. 18-86.
 A plan in which some sixty clubs or social organizations in this school, with an enrollment of 2000 pupils, were started, developed, and administered.
237. **Monthly Evening Sky Map.** Brooklyn, New York: Leon Barrett, Publishers, 367 Fulton Street. Monthly, Vol. 1—date; 1907—date.
 This publication is suited to the needs of the more advanced amateur for which it would seem more or less indispensable.
238. **Morton, Cora.** "A Novel Chemical Quiz," *Journal of Chemical Education*, 4:84-85, January, 1927.
 The letters of each italicized unit will spell the name of an element. Material for the "fun" period in the program of a chemistry club or section.
239. **Movie Makers.** (Vol. 1-2 as *Amateur Movie Makers*). New York: Amateur Cinema League, Inc. Monthly, Vol. 1—date; 1926—date.
 Although most of the clubs involved are adult organizations, the League has some juvenile clubs. The suggestions in the "Amateur Clubs" department are appropriate for all types.
240. **Murphy, F. W.** "Science Clubs That Work." *General Science Quarterly*, 4:330-34, January, 1920.
 A description of the organization, administration, and activities of the Edisonian Science Club in the Irvin Avenue Junior High School at Pittsburgh.
241. **Myers, W. H.** "The Financial Control of Student Activities," *American School Board Journal*, 79:48, 146, November, 1929.
 A general treasury and a budget supervised by a finance committee is used as a means of controlling unwarranted expenditures in athletics.
242. **National Board of Fire Underwriters.** *Trial of Fire.* New York: National Board of Fire Underwriters.
 A program suitable for use by a junior high-school club.

243. **National Research Council.** "Handbook of Scientific and Technical Societies and Institutions of the United States and Canada." Bulletin, No. 76. Washington: National Research Council, 1930. 352 p.

244. **Nelson, Roberta.** "Science Newspaper," *School Science and Mathematics*, 31:339-40, March, 1931.

A detailed discussion of a worth while activity as conducted by the science classes organized as a club in the Prince School of Boston.

245. **Newhall, C. W.** "A Secondary School Mathematics Club," *School Science and Mathematics*, 11:500-9, June, 1911.

An account of a club organized in 1903 in the Shattuck School, at Faribault, Minnesota. A bibliography and outlines of two programs are included.

246. **Nifenecker, E. A.** "Organization of Subject Matter—Types of Exercises." *The School Assembly*. New York: Board of Education, 1917, Chapter IV.

Special group activities, including the science club, nature study, and arts and crafts work, and community life outside of the school are dealt with.

247. **North Central Association of Colleges and Secondary Schools.** "Report of the Sub-Committee on Extra-Curricular Activities," *North Central Association Quarterly*, 3:542-88, March, 1929.

This lists specific things pupils do, evaluates activities, considers clubs as of eleven types in detail, and includes a bibliography on the subject. Various pure and applied science clubs, among others, are treated.

248. **Odell, C. W. and Blough, J. H.** "An Annotated Bibliography Dealing with Extra-Curricular Activities in Elementary and High Schools," *University of Illinois Bulletin*, Vol. 23, No. 24, Bureau of Educational Research Bulletin No. 29, Urbana: University of Illinois, 1926. 40 p.

An annotated list of almost three hundred references dealing with various aspects of extra-curricular activities.

249. **Oerlein, K. F.** "Science Clubs for Service," *School Science and Mathematics*, 31:314-20, March, 1931.

The writer believes that practices in club organization are ineffective on account of artificial aspects under which they operate, and that clubs should be organized for definite needs in life. Membership in the three sections of the club is highly selective. Its activities include annual benefit programs, issuance of a mimeographed journal, development of a club library, device contests, assembly programs, and an Inter-Suburban High School Science Club League.

250. **Oesterling, H. C.** "The Illinois Junior Academy of Science," *School Science and Mathematics*, 31:461-63, April, 1931. Also, *Chemistry Leaflet*, 5:38-39, September 17, 1931.

A brief historical statement, together with a statement of the writer's conception of what constitutes a science club.

251. **Osburn, Ellsworth.** "The Science Demonstration in the Junior-Senior High School," *General Science Quarterly*, 12:227-36, 305-17; May, November, 1927.

A comprehensive discussion, with suggestions for exhibits at each grade level. Includes details for the organization and presentation of the exhibit.

252. **Osburne, R. W.** "The Chemistry of Water," Francis W. Parker School Year Book, Vol. 2. Chicago: Francis W. Parker School, 1913, p. 84-89.

A verbatim report of the program given jointly by the chemistry and physics classes. Three boys, three girls, the sponsor, and the audience participate.

253. **Osborn, W. J.** A Study of Children's Interests. Madison, Wisconsin: State Department of Public Instruction, 1926. 23 p.

The writer points out that after children are fourteen years of age, they usually join either student clubs or permanent adult organizations already in existence.

254. **Otto, Carl and Freedman, H. B.** "A Chemical Vaudeville Show," School Science and Mathematics, 28:755-63, October, 1928.

Seven characters present three acts, as follows: I. "The Grand Pageant of Alchemy"; II. "A Bunch of Non-Scents"; III. "Odds and Ends." Detailed suggestions are included.

255. **Palmer, J. T.** "Extra-Curricular Activities," American Educational Digest, 44:260-61, February, 1925.

This considers the place of clubs in high-school life.

256. **Parsons, G. L.** "Your Opportunity—An Industrial Play," Industrial Arts Magazine, 18:51-54, February, 1929.

A play in two acts with two stage sets. Deals with the future of the eleven or more boys in the cast. Time, about forty-five minutes.

257. **Peaslee, L. D.** "Out-of-Door Science Club for High School Students," School Science and Mathematics, 18:337-45, April, 1918.

This gives the plan of the Milwaukee Science Club for boys organized by the Department of Education of the Public Museum of Milwaukee. Applications to other types of science clubs are made.

258. **Pechstein, L. A. and McGregor, A. L.** Psychology of the Junior High School Pupil. Boston: Houghton Mifflin Company, 1924, p. 221-25.

A brief discussion on clubs for the junior high school.

259. **Peter, W. W.** Mastodons, Microbes, and Man. New York: Cleanliness Institute, Department of Health Service.

An illustrated lecture on cleanliness.

260. **Pfeiffer, O. A.** "The Scope and Function of Home Rooms, Clubs, and Associations in the Program of Special Activities," A thesis submitted for the Master's degree at the University of Texas. Austin: University of Texas.

A review of the literature on home rooms and a detailed account of the pioneer work in the San Antonio schools.

261. **Phelan, M. C.** "New Home-Room Activity," Sierra Educational News, 26:34, June, 1930.

The plan used in the John Burroughs Junior High School of Burbank, California, wherein each student invites about five friends to a school luncheon, after registering at office to avoid duplication. Orchestra music and yells are followed by an assembly hour.

262. **Pierce, L. M.** "Our Chrysalis Club," *School and Society*, 34:231-32, August 15, 1931.

This describes an organization drafted from the upper 10 per cent and existing for the purpose of making the mentally brightest pupils the most attractive, popular, and useful.

263. **Pitcher, W. E.** "Mathematics Club Meets," *Mathematics Teacher*, 24:199-207, April, 1931.

A one-act play on the early methods of writing numbers, and the ways of adding, subtracting, and multiplying as presented by the Mathematics Club of the Rawlings Junior High School, Cleveland, for four boys and twelve girls.

264. **Pope, M. E.** "The Science Club," *School Science and Mathematics*, 26:552, 554, May, 1926.

Specific suggestions for organization and operation are given.

265. **Porter, Louise.** "The Animals' Protest," *Hygeia*, 8:466-68, May, 1930.

A one-act play for three boys and three girls of either junior or senior high school.

266. **Potter, Lula.** "An Experiment of a Science Club," *South Dakota Education Association Journal*, 6:390, March, 1931.

267. **Prall, C. E.** "Objective Aids in the Administration of a Club Program," *Junior-Senior High School Clearing House*, 5:401-7, March, 1931.

The writer discusses the technique that has been utilized to date and the probable outcome of an anticipated extension of these procedures.

268. **Prichard, D. W.** "The Water Supply," *Journal of Chemical Education*, 5:1671, December, 1928.

A prize-winning plan for a city high-school chemistry club.

269. **Pruitt, C. M.** "Activities of Chemistry Clubs," *Journal of Chemical Education*, 4:1037-42, August, 1927.

This describes the plans of Lincoln School and of the high schools of Pittsburgh. Includes the aims and purposes of the clubs, suggested and detailed club programs, and activities.

270. **Public Education and Child Labor Association of Pennsylvania.** "Extra-Curricular Activities," Report of the Survey of the Public Schools of Philadelphia by the Pennsylvania State Department of Public Instruction, Book 4. Philadelphia: Public Education and Child Labor Association of Pennsylvania, 1922, p. 113-163.

This survey involves eleven high schools in Philadelphia.

271. **Putnam, Helen.** "Three Exercises on the History of Pottery," *Francis W. Parker Yearbook*, Vol. 2. Chicago: Francis W. Parker School, 1913, p. 100-10.

Indian, Japanese, and Egyptian scenes suitable for science clubs of high-school level, or for elementary and high school combined.

272. **Rakestraw, N. W.** "A Model Chemistry Clubroom," *Journal of Chemical Education*, 7:891-92, April, 1931.

A suggestive description of a clubroom at Brown University.

273. **Ralph, L. V.** "Leisure Value of Clubs." *New York State Education*, 19:36-7, 93, September-October, 1931.

This discusses such industrial-arts clubs as camera, toy, aeroplane, and boat as found in the Central Park Intermediate School at Schenectady.

274. **Redenbaugh, W. A.** "Science Department and Motion Pictures," *Educational Screen*, 9:6-7, January, 1930.

A brief account of the activities of a successful science club and of the point system used.

275. **Reed, Zulu.** "High School Mathematics Clubs," *Mathematics Teacher*, 18:341-64, October, 1925.

Values to be derived from such clubs, material for club programs, and an extensive annotated bibliography including various helps are included.

276. **Reeve, M. E.** "A Trip Through the Sky," *General Science Quarterly*, 10:474-78, March, 1926.

A one-act play involving a witch, the planets, Sirius, Arcturus, a planetoid, and the sun.

277. **Richard, C. W.** "Business Management and Analysis of Student Activities," *Educational Research Record*, 2:106-17, February, 1930.

This includes extensive tables on methods of control and on financial turnover.

278. **Roberts, A. C.** "An Experiment in Socialization," *School Review*, 26:25-34, January, 1918.

This includes a brief statement of club activity in the high school at Everett, Washington.

279. **Roberts, A. C. and Draper, E. M.** *Extra Class and Intramural Activities in High School*. New York: D. C. Heath and Company, 1928, p. 344-57, 443-65, 486-98.

The pages indicated in the reference outline important aspects of club work for five mathematics and ten science clubs, most of which are in western states. Mathematics and science clubs in the academic program, principles and practice in the effective control of extra-curricular finance, and probable future development of extra-curricular activities to meet new democratic and social demands are points dealt with.

280. **Roberts, Ethel.** *Science Defends Itself*. Clairton, Pennsylvania: Ethel Roberts, Fifth Street Junior High School.

A science play with eight characters.

281. **Roberts, J. E.** "Extra-Curricular Principles and Practices," *High School Teacher*, 5:173, February, 1929.

A discussion of assignments given to sponsors to insure even loads for all.

282. **Roemer, Joseph.** "Comparison of Advantages and Disadvantages in Developing Extra-Curricular Activity Programs in Large and Small High Schools," *School Life*, 15:66-68, December, 1929.

An evaluation made by 105 students in an education class studying extra-curricular activities. Includes a list of advantages and disadvantages of these activities.

283. **Roemer, Joseph.** "Introducing a Program of Extra-Curricular Activities in the Junior High School," *School Review*, 36:516-21, September, 1928.

The constructive program, as developed in the Memorial Junior High School of Tampa, begins with the faculty, passes to the Parent-Teachers Association, then is submitted to the pupils. The teachers were finally given an opportunity to work on that phase of the program most interesting to them.

284. **Roemer, Joseph.** "My Ideal Club," *Junior-Senior High School Clearing House*, 5:385-86, March, 1931.

The author's conception is that the whole purpose of the club is social and recreational, and that the chief undertakings consist in "the development of adolescents morally, socially, and spiritually by guiding them into and through activities especially designed to achieve these ends."

285. **Roemer, Joseph.** "Standards for Judging a Club Sponsor," *Junior-Senior High School Clearing House*, 5:398-400, March, 1931.

Two score cards for judging the club sponsor are presented. One is for the beginning and the other for the end of the semester. The points are divided into three categories: fitness, attitude, and technique.

286. **Roemer, Joseph and Allen, C. F.** *Extra-Curricular Activities in Junior and Senior High Schools*. Richmond, Virginia: Johnson Publishing Company, 1929, p. 100-9.

Club activities are treated in the pages given.

287. **Rohrback, Q. A. W.** *Non-Athletic Student Activities in the Secondary Schools: A Study of Aims and Outcomes*. Philadelphia: Westbrook Publishing Company, 1925. 233 p.

Science activities include both the pure and applied science clubs. Aims and outcomes are treated from a critical point of view, in terms of (1) conduct control, (2) leadership training, and (3) time devoted to activities by students.

288. **Rosenthal, Alice.** "Science Motivation and the Science Club," *School Science and Mathematics*, 31:463-64, April, 1931. Also, *Chemistry Leaflet*, 5:39-41, September 17, 1931.

Herein is briefly described a boys' science club with weekly programs and the requirement that each member appear on programs once a year. Its activities include illustrated lectures, entertainments, excursions, and an annual scientific assembly demonstration.

289. **Ruddick, Dorothy, et al.** "Interference—A Chemical Play," *Journal of Chemical Education*, 4:905-7, July, 1927.

A one-act play for eleven characters, at least one of whom must be a girl. It deals with relationships of atoms, molecules, valence, and certain elements as developed by the authors in the senior high school of Keokuk.

290. **Rugg, E. U., et al.** "Summary of Investigations Relating to Extra-Curricular Activities," *Colorado State Teachers College Series*, No. 9. Greeley: Colorado State Teachers College, 1930. 304 p.

Presents summaries of eighteen investigations in the field of extra-curriculum activities, several of which have to do with clubs.

291. **Rusk, R. D.** *How to Teach Physics*. Philadelphia: J. B. Lippincott Company, 1923, p. 153.

A brief statement about science clubs as a means of vitalizing physics courses.

292. **Russell, R. D.** "What Benefits Do Pupils Derive from School Clubs?" *Nation's Schools*, 7:35-40, March, 1931.

A study based on the returns from 288 schools of Idaho, Montana, Oregon, and Washington. Administrative evidence indicates that in those states, as activities are organized at present, there is less interest in subject-centered clubs than in others.

293. **Sargent, E. W.** "Keeping Up Club Interest," *Movie Makers*, 5:487, 501-2, August, 1930.

The suggestions given are more or less applicable to other clubs.

294. **Schlierholz, T.** "A Number Play in Three Acts," *Mathematics Teacher*, 17:154-69, March, 1924.

A dramatization of D. E. Smith's, "Number Stories of Long Ago," as presented by the students of the Ben Blewett Junior High School in St. Louis.

295. **Science Classroom.** New York: Popular Science Publishing Company, Vol. 1—date; 1921—date.

This periodical includes a valuable department devoted to science-club activities.

296. **Scientific Book Club Review.** New York: Scientific Book Club, Inc., 80 Lafayette Street.

Official organ of the Scientific Book Club. The publication maintains a juvenile department. Includes book lists which are dependable as a basis of building a science-club library or a club department in a school library. Membership in the club involves no dues or fees.

297. **Shatts, W. P.** "Education That Helps Boys to Plan Their Lives," *American City*, 26:593, June, 1922.

A brief outline of a cooperative plan between industry, the Chamber of Commerce, and the high school whereby boys in New Haven, Connecticut, may be better informed about the industrial opportunities and extent of manufacturing through the "Know New Haven Industries" organization. It includes a five-point questionnaire for the industries with a general outline for all industrial lectures.

298. **Sheehan, M. A.** "Clubs; A Regular School Activity," *High School Journal*, 4:132-35, October, 1929.

The club idea as it functions in the Washington Junior High School of Rochester. The relationships to the cardinal principles, to organization, and to the objectives for more than fifty clubs is considered.

299. **Sheehan, M. A.** *Extra-Curricular Activities in a Junior High School.* Boston: R. G. Badger, 1927. 181 p.

Portions of this deal with the club period; outlines the club idea; lists clubs, activities, objectives, and conditions; and cites references.

300. **Shelton, J. A.** "Ion Visits the Realm of Air," *School Science and Mathematics*, 26:960-65, December, 1926.

A one-act play for the science club.

301. **Shepherd, H. R.** "A Survey of Extra-Curricular Activities in the Senior High Schools of Kansas City, Missouri," A thesis submitted for the Master's degree at the University of Chicago. Chicago: University of Chicago, 1927. 146 p.

The study involves five pure and applied science clubs in schools where the staffs have adopted a policy of endorsement for such activities and are dealing with the activities in a constructive way.

302. **Shiple, S. C., et al.** "Food and Health," *Science Education*, 14:637-46, May, 1930.

A play in three acts with one stage set for eighteen junior high-school girls. Suitable for a Health Week program.

303. **Shoemith, B. I.** "Mathematics Clubs in the Secondary Schools," *School Science and Mathematics*, 16:106-13, February, 1916.

This includes historical references to first mathematics club organized at Faribault, Minnesota, in 1903.

304. **Short, D. L.** "A Playlet—With a Grain of Salt," *Chemistry Leaflet*, 5:188-92, October 15, 1931.

A playlet in three acts and six scenes for seven boys and six girls.

305. **Shortridge, Virginia.** *Songs of Science; An Anthology.* Boston: Marshall Jones Company, 1930. 245 p.

An anthology of the poetry of reason, consisting of more than two hundred complete poems and many excerpts.

306. **Shouse, R. D.** "High School Clubs," *School Review*, 36:141-46, February, 1928.

The practices in a St. Louis junior-senior high school are described. Successful club life was finally arrived at with activities in the last period of the day. Ten reasons why the activity period is as important as any other period in the school day are given.

307. **Shriner, J. T.** "Science Clubs Urged for High Schools," *School Science and Mathematics*, 25:149, February, 1925.

A brief statement of values ascribed to science clubs, based on the activities of these clubs in the Latimer Junior High School, Pittsburgh.

308. **Smith, G. M.** "Science Clubs in the High School," *School Science and Mathematics*, 25:720-24, October, 1925.

Survey of fifty-seven high schools represented by the Northern Illinois State Teachers Association. Only six of those making replies had science clubs. Outlines work of five Rockford science clubs.

309. **Smith, H. R.** "Live Chemistry," *School Science and Mathematics*, 15:260-1, March, 1915.

An account of how success in classroom teaching has been obtained through a research club.

310. **Smith, M. W.** "The School Museum," *Science Education*, 15:111-15, January, 1931.

This points out six values derived from the museum. The organization and development of museums is an objective of many science clubs.

311. **Smith, W. A.** *The Junior High School.* New York: Macmillan Company, 1925, p. 290-99.

The place and desirable practices of clubs in the junior high school.

312. **Snedden, David.** "The Club, a Factor in Education," In Monroe, Paul, et al., *Principles of Secondary Education.* New York: Macmillan Company, 1914, Chapter XXI.

A general discussion of clubs and their values.

313. **Snyder, E. E.** "Report on the Biology Club of the Little Falls High School," *School Science and Mathematics*, 31:32-33, January, 1931.

The activities of this club include scored contests with awards, creative plays, and motion pictures.

314. **Spalt, M. C., et al.** "An Assembly Awakening," *Science Education*, 13:250-57, May, 1929.

A one-scene astronomical play for fifteen junior high-school students. Twenty minutes are required.

315. **Spaulding, F. T.** "What Extra-Curricular Activities Ought a Good School Not to Offer," *Educational Method*, 9:140-50, December, 1929.

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A. Subjective and near-subjective discussions

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10, 11, 19, 38, 40, 41, 47, 48, 50, 53, 57, 59, 60, 62, 70, 75, 77, 90, 91, 103, 105, 108, 110, 115, 117, 133, 139, 142, 156, 158, 159, 164, 166, 199, 206, 209, 210, 215, 222, 226, 227, 228, 240, 241, 245, 246, 250, 251, 258, 265, 267, 273, 274, 276, 277, 280, 287, 289, 292, 294, 296, 297, 304, 308, 310, 318, 328, 340, 342, 350, 366, 367, 370, 372, 377, 378, 386, 393, 395, 399, 400, 402.

2. Local activities including programs of all sorts, business and social meetings, exhibits, plays, and other types of projects and activities

4, 6, 8, 9, 10, 13, 15, 16, 17, 20, 24, 25, 27, 28, 29, 30, 31, 33, 35, 36, 37, 38, 42, 44, 45, 48, 49, 53, 55, 56, 57, 58, 60, 61, 64, 65, 66, 67, 71, 74, 76, 85, 88, 89, 91, 98, 99, 100, 103, 104, 105, 107, 111, 114, 115, 116, 118, 128, 131, 134, 137, 140, 141, 143, 144, 145, 147, 148, 150, 152, 154, 156, 164, 173, 174, 175, 176, 184, 185, 186, 188, 189, 191, 194, 195, 197, 201, 202, 204, 205, 206, 209, 210, 211, 213, 219, 224, 229, 235, 236, 238, 239, 241, 243, 244, 245, 246, 247, 250, 252, 253, 255, 257, 260, 262, 264, 266, 269, 270, 272, 275, 276, 279, 281, 289, 290, 295, 296, 297, 301, 303, 305, 306, 309, 311, 314, 315, 317, 319, 320, 323, 324, 325, 326, 327, 328, 336, 340, 341, 343, 344, 346, 351, 352, 353, 355, 357, 358, 360, 361, 363, 369, 371, 372, 373, 374, 375, 376, 379, 380, 381, 382, 385, 387, 388, 389, 390, 391, 392, 394, 395, 396, 397, 398, 401, 403, 404.

3. State and national activities

12, 14, 43, 68, 155, 163, 167, 168, 196.

B. Objective and near-objective data

18, 70, 309, 349, 356.

II. References dealing altogether or chiefly with related extra-curricular activities

A. Subjective and near-subjective discussions

1. General discussions of historical, administrative, supervisory, organization, and other aspects

2, 3, 5, 39, 40, 46, 52, 63, 72, 79, 82, 93, 94, 96, 106, 113, 119, 120, 121, 122, 124, 126, 127, 151, 153, 157, 161, 169, 171, 172, 177, 179, 183, 192, 203, 207, 208, 212, 214, 220, 221, 225, 230, 231, 234, 237, 248, 256, 284, 285, 298, 300, 307, 312, 313, 316, 321, 322, 332, 333, 337, 338, 345, 347, 348.

2. Supervision chiefly from the standpoint of the sponsor

26, 112, 160, 165, 216, 282, 331, 362.

3. Related guidance work

87, 92, 96, 106, 136, 298, 338, 339.

4. Awards, competitions, point systems, and other recognition

59, 78, 102, 169, 208.

5. Financial aspects
7, 23, 51, 101, 121, 138, 178, 181, 217, 223, 232, 242, 278, 359.
6. Biological, psychological, and sociological aspects
22, 32, 34, 39, 54, 69, 75, 83, 112, 120, 146, 157, 177, 187, 200, 218,
233, 254, 259, 263, 279, 285, 299, 334, 345.
- B. Objective and near-objective data
 1. Objectives and principles
84, 179, 190, 198, 288.
 2. Analyses and validations
1, 21, 125, 135, 162, 193, 248, 268, 283, 286.
 3. General surveys of actual practices
73, 80, 81, 95, 97, 109, 122, 129, 180, 182, 261, 271, 293, 302, 330, 365,
368, 383.
 4. Relationships with scholarship, personal characteristics success
outside of school and so forth
21, 32, 86, 132, 149.
 5. Important bibliographies and summaries
83, 123, 130, 170, 230, 231, 248, 249, 261, 291, 329, 335, 354, 355, 364.

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