BULLETIN

OF THE

AMERICAN ASSOCIATION

OF

JESUIT SCIENTISTS

Eastern States Division

VOLUME 39 December, 1962 NUMBER 4

Bulletin of the American Association of Jesuit Scientists

Eastern States Division

(FOUNDED IN 1922)

For Jesuit use only

Editorial Office

Woodstock College

Woodstock, Maryland

Second-class postage paid at Woodstock, Maryland. Published quarterly at Woodstock College, Woodstock, Maryland, by the American Association of Jesuit Scientists (Eastern States Division).

Annual dues for members of the Association are $6.00. A subscription to the BULLETIN is included among the privileges of membership.

To our readers...

You will notice some staff changes on the masthead for this issue. Fr. James F. Smith, after serving as editor of the BULLETIN for two years, has asked to step down from that post, and the Executive Council of the Association has appointed Mr. Charles L. Currie, the former news editor, in his place. The size of the staff has also been increased and Mr. George V. Coyne has been appointed as news editor.

The new editor, from working with his predecessor for the past two years, realizes how much the BULLETIN owes to Fr. Smith, and he is most grateful for being assured of his help and consultation in the coming year.

In his first editorial in the March, 1961 issue, Fr. Smith described the publication of the BULLETIN in its new format as an "experiment," an experiment to test the vitality of the BULLETIN. We have been conducting that experiment for two years, and by the time you receive this issue you will have been asked in a questionnaire for your comments on the success of our efforts. As noted in that first editorial, the BULLETIN finds its only reason for existence in the service it renders to Jesuit scientists in their studies, teaching, and research. With the volume of scientific and educational literature today, a publication such as ours must be submitted to continual re-evaluation to insure that it has something *specific* to offer its readers.

The BULLETIN staff under Fr. Smith has been engaged in just such a self-evaluation, and we hope that by combining our own thoughts with the information gathered from the questionnaire we will be able to continue editing a publication that you will find helpful in your work.

In the September issue of the BULLETIN we noted the golden jubilee of the ordination of Fr. Joseph S. Didusch, S.J. at Loyola College in Baltimore. It is our privilege in this issue to commemorate a similar jubilee in the distinguished life of Fr. Henry M. Brock, S.J. of Weston College. The citation on the occasion of Fr. Brock's being awarded an honorary degree by Boston College expresses the esteem of all who have known and admired this truly great priest-scientist.

We hope in a future issue to commemorate the golden jubilee in the Society of Fr. Thomas P. Butler, S.J., of Boston College, and the sixtieth anniversary as a Jesuit of Fr. Joseph M. Kelley, S.J. of Loyola High School in Baltimore.

To our four honored jubilarians, in the name of all BULLETIN readers, we express our warmest congratulations and wish God's richest blessings *ad multos annos.*

There is much discussion today of the problem of the "two cultures." Addressing the student body at Loyola College, Mr. Welcome W. Bender, director of the Research Institute for Advanced Study (RIAS), exhorted scientist and non-scientist to help one another appreciate the implications of science in today's world. His remarks on "Science and the educated man" would be complemented by an article by Fr. Joseph F. Mulligan, S.J., "Jesuit education and the natural sciences," in the March, 1959 issue of the *Jesuit Educational Quarterly.*

The sectional programs at the annual meeting of the Association reflect an increasing awareness of the close collaboration demanded of high school and college for effective scientific education today. Readers of the BULLETIN should find helpful the survey by Mr. Eugene A. Zimpfer, S.J. of the latest NSF programs fostering such high school-college cooperation.

Over the past two years the section of the BULLETIN entitled "Reports of Scientific Activity" has been dependent for material on the correspondants you will find listed in this issue. The staff of the BULLETIN thanks them publicly for their most generous cooperation.

As this issue of the BULLETIN goes to press, the October issue of the *Jesuit Educational Quarterly* has just appeared. It contains an excellent symposium on the role of the humanities, the social sciences, and the natural sciences in the Jesuit liberal arts college of today, and should be of considerable interest to our readers.

FIFTY YEARS A PRIEST: FATHER HENRY M. BROCK, S.J.

Rev. Henry M. Brock, S.J., professor emeritus of physics and astronomy at Weston College, observed the Golden Jubilee of his ordination on August 24 of this year. The community celebration in honor of Fr. Brock, the oldest Jesuit in the New England Province, was held at Weston College on September 20. A Solemn Mass and *Te Deum* were sung by the community, with Very Rev. John V. O'Connor, S.J., Provincial of the New England Province, as celebrant. Many of Fr. Brock's former students were in attendance at the Mass as well as at the jubilee dinner later in the day.

A native of South Boston, Fr. Brock was born May 8, 1876, and attended Boston grammar schools and Boston College High School. He graduated from Boston College in 1897, and from Massachusetts Institute of Technology in 1900. On joining the Society, he studied at Woodstock College and in Hastings, England. He was ordained at Hastings by Archbishop Amigo of Southwark on August 24, 1912. On his return to the United States, he taught physics, geology, astronomy and German at Holy Cross College. During this time he contributed articles for ten of the fifteen volumes of the *Catholic Encyclopedia*. In addition to other teaching assignments at Woodstock and Weston, Fr. Brock served as Rector of St. Robert's Hall, Pomfret, and as pastor of Holy Trinity Church, Boston.

His writings, besides the encyclopedia entries, include contributions to several professional journals, *America*, and *Catholic World*. One of the founders of the American Association of Jesuit Scientists and a former president of the Association, he has been a frequent contributor to the BULLETIN, and was its editor for a time.

Boston College honored him with the degree of Doctor of Science in 1960, and in October of the same year, Cardinal Cushing paid him moving tribute as teacher, scholar, scientist, and priest. Former President Eisenhower was among those congratulating Father Brock on his reception of the doctorate. Mr. Eisenhower saluted him for his "life of service in the field of science and education."

The text of the citation with which Fr. Brock was awarded the honorary degree from Boston College is given below.

> When the President and the Trustees of Boston College learned of the approaching jubilee of Father Henry Matthias Brock of the Society of Jesus, we determined with unanimous enthusiasm to attest in the most ample terms at our command the affection of the University for this eldest son of Alma Mater.
>
> For we marked in him the uncommon gifts of mind and character which made Plato write of Socrates: "You are the noblest and gentlest and best of all who ever came to this place." We saw the garnered wisdom which has made of

his life a precious book of hours, eloquent with the prose of labor and the poetry of prayer. We were united in the resolve to place before the generous ambitions of our students this bright exemplar of the Christian humanist who has cast the auguries of the weather and the stars and who still in his ninth decade of life reads Dante and Sophocles. We hail in him the great priest and the compassionate director of souls, the incomparable teacher to whom a whole province has gone to school.

This is an historic hour for the Jesuit Province of New England, for one man's life and one man's trove of memories move us as does the persuasion of music into the contemplation of a glorious past. We see Henry Brock before the baroque altar of the Church of the Immaculate Conception selecting from the lexicon of youth the watchwords of a noble life: duty, learning, innocence. We watch him at his laboratory table at the Massachusetts Institute of Technology challenging the mysteries of energy and matter, and searching the palimpsests of the tides on the Kentish shore.

We remember him as pastor of little flocks in Maryland and in Boston, and as molder of scholars, the first Professor of Physics of our new University, the senior Professor and beloved patron of all the Jesuit faculties of science in New England.

Dear Father Brock: what learned or godly or generous deed have you left undone? How wisely you have kept your legionnaire's stride on the Roman road of scholarship! How marvelously in your harvest time of age and wisdom and grace you speak to the thousands who love you from a heart still eternally young!

Mindful of the authority delivered to them by the Commonwealth of Massachusetts, the President and the Trustees of Boston College have summoned to this convocation of our faculties of philosophy and theology, the Reverend Henry Matthias Brock of the Society of Jesus, Bachelor of Arts of the Class of 1897, and now with unbounded gratitude and affection proclaim him

DOCTOR OF SCIENCE

honoris causa

SCIENCE AND THE EDUCATED MAN

W. W. BENDER

The dedication here today of Maryland Hall, the engineering-physics building on the campus of Loyola, and its welcome acceptance within the liberal arts tradition of this college, is indeed noteworthy, for it marks an increasing awareness of the importance of science and technology in all of our lives today.

We of the community of Baltimore and Maryland are very proud of Loyola on this significant occasion. Many of us who are perhaps closer than the average person to the currents of science in the world today, are especially delighted to note the greater emphasis on science and engineering in the curriculum at Loyola.

It is good that we mark this day for *many* reasons. . . . but there are two particular ones upon which I should like to reflect in my remarks today, in order to help establish for each of you who study here a clarity of perspective on science and technology.

Needed: intelligent familiarity with science. My first point revolves around the fact that the activities of all the world today and in the years immediately ahead will require that men, societies, states, and nations be intelligent in science to a degree never before encountered in history. We see science and technology all around us and whether we would or not, we are all somehow involved in it. Our statesmen need to know a great deal more than the rudiments of physics to discharge their responsibilities, for disarmament today is as much a problem of science as it is of diplomacy.

A fantastic amount of our national resources in talent and equipment—15 billion dollars a year—are spent alone in technical research and development. There is hardly a community which is not affected. Advanced mathematics is playing an increasingly prominent role in the management of business, government, the military. Our everyday citizen finds himself reading newspaper editorials on science, which are further evidence of the interweaving of science in our public affairs. Science has become a major part of the fabric, or language, of our society. For this reason, the educated and mature man, whatever his association, must have a certain familiarity and fluency in science.

As for the professional scientists themselves, if they are to work for the benefit of man, they must be in a position to communicate with their non-

This address was delivered at the dedication of the new engineering-physics building at Loyola College, Baltimore, Maryland on September 20, 1962.

scientific partners. This imposes as much a demand on the man educated in the liberal arts as it does on the scientist. It requires of the liberal arts major a reasonable understanding of the language of science, particularly its "mother tongue"—mathematics. It requires an understanding of the processes involved in scientific thinking, if two-way communication is to be effective. And.... it requires some understanding of the limitations of science at a given time and place, or else we'll make ourselves vulnerable to scientific tyranny, where blind technology without moral values could lead us to a fantastic tower of Babel.

Appreciate the method. Now, the other important reason for the increased emphasis on science is that the modern educated man must be exposed to (and understand) the scientific method as a means to logical, creative thinking, and to sound, step-by-step progress. He must appreciate the role of experiment to check hypothesis and learn that experiment implies the probability of failure as well as success and that both are kin to progress.

He is called on each day to make judgments on such things as the space race, the use of wonder drugs, the containment of the atmosphere and whether to add fluorine to public water supplies. Problems in geriatrics, control of the weather, world population.... all of these are a great mix of moral, political, and philosophical questions—yet all require an understanding of how scientific progress comes about. The general public is still far from educated in this regard, but, like a sports fan at a ballgame, always expects success and is intolerant of failure. In the extreme, governments and others often tend to suppress news of the errant experiment, afraid of the public reaction. It will be some time before we have public confidence that experiments are only made because we are not sure—but are probing for the truth—and that some results will be positive and others negative.

Scientists working on controlled thermonuclear fusion have, with tongue in cheek, dubbed one of their fantastic magnetic plasma machines a "perhapsatron".... knowing full well that when it is completed, perhaps it will and perhaps it won't give the desired results. Do we all understand that there is more sound truth than humor in such a name tag?

I have mentioned a few examples to try to show that the scientific process pervades so much of the activities of man today. Just as the study of poetry can serve the writer as a tool in understanding the myriad ways that a thought can be expressed, so a study of the scientific method of observation, deduction and creative synthesis and further experiment is a most important tool of the educated man in whatever field he pursues.

Science as tool. As a tool, science and technology can accomplish what man *cannot* do *without* it. Remember, the sculptor's chisel must be guided

by visions of the sculptor . . . the Mariner II on its way toward Venus may be coached and guided through intricate computers, but man must first have contemplated the journey and decided it was worth attempting. In short, science, as a tool, can often *solve*, but cannot *pose* the problem—or decide which is the important problem.

In this important area, the key word is TOOL. The mature man knows and respects science as a tremendous tool, made gradually available to mankind through the vigorous pursuit of his God-given curiosity and ingenuity. I would also make the point that without understanding the principles of the scientific method, modern man is shut off from a major sector of our culture.

But as the pendulum swings to an increased understanding of science, there is a trend in our generation (more prevalent perhaps in the Communist than in the Western world, but rampant in both) that sees great good and great power in science and technology, and, in extreme cases, often regards it as the overriding objective of all of life. . . . for all people. Its advocates conclude that we need merely increase our scientific and technological activities and we will thereby attain the ultimate good life for men. Where once the scientist was considered as the genius starving in a frugal attic laboratory, he now becomes the patron saint of mankind. . . . knee-deep in money and apparatus, expected to dole out a breakthrough each day. His prestige increases, his earning power increases and a quick glance at the employment advertisements in our press (and their Soviet equivalent I suspect) convinces mother and dad of the desirability of a career in science and engineering. It matters little whether Johnny is from Memphis or from Minsk.

Let's look critically at this trend. Is it right to make magic out of science? Do we honestly believe that science is good or bad in itself, or that science is all that we need to improve our lives. . . . to bring nobility to the spirit of men? Or—are we in danger of making an idolatry out of science to be praised for our fortunes and blamed for our misfortunes? The educated man must decide where to put the emphasis and sort out truth from fallacy. He must be able to discriminate between knowledge and moral values.

You who are studying here at Loyola are surely aware of the fallacy of such patterns as I have described—although their advocates can point to great material progress which science has wrought. You are aware—and I hope you will never forget—that science and all that it begets in engineering and technology is neither good nor bad in itself, nor an end in itself, but simply an implement in the hand of man who can use it to ennoble or degrade, use it carefully or wantonly.

Before physics or engineering, or any other ordered discipline, can be brought to bear, the educated man in the world today must first recognize and contemplate the problems in the specific and the abstract and must

decide what problems need to be solved, what problems are important, and in which problems science can be of help. And these judgments are influenced by factors far beyond the limits of science itself. In general, they require a much broader understanding of human values, activities and goals. They require a perspective of the full range of man's interests and a good line of communication between the scientific and non-scientific community. In short, the educated man of today who will be the leader of the next decade must really be a member of humanity in the broadest sense.

The "whole man". Membership in humanity means, for the scientist, that he must be a "whole man". . . . educated in more than just his branch of science. In other words, he must learn something of the liberal arts, the humanities. He must "touch base" with those who think in terms of man's purpose and nature. He must learn the history of man, for it is only by reading the milestones telling us where we are in relationship to our point of departure, that we can plot a course into the future. He must learn something of man's communicative character—not merely in terms of radio signals, business letters or laboratory reports—but also in terms of man's great sensitive expressions in the creative arts. He must learn the languages of men before him in order to use his own effectively.

You at Loyola are fortunate to share in the rich culture of a Jesuit education. The faculty here are well qualified to help you to determine values and principles within which you as a man can make your life worthwhile. They will help you recognize the position of science and technology in this broad picture. From there on, the "you" that is scientist—or economist —or writer—or whatever your calling—will be better prepared to shoulder the responsibilities we all face in what is certainly a very complicated world.

I am sure the good Fathers who projected this building have not intended that all of you pursue careers in science and engineering. For many of you, to be sure, there will be great satisfaction in science; you will enjoy the rare emotional and intellectual experience of original discovery and recognize that science is truly an adventure of the human spirit. You will go on to graduate work and careers in which you will have opportunity to push back the frontiers of man's ignorance, and build tomorrow what we can't even imagine today.

As you acquire more knowledge, you will become more humble as it dawns on you how little science has really yet told us of nature's vast secrets. You will, indeed, be a fortunate few.

But I believe the greater value of Maryland Hall will be to instill in all of you, whether you pursue science or engineering, medicine or law, business or government, a deep realization of the fabulous assets and capabilities of science, and yet a careful awareness of its limitations and liabilities.

Truly, you will here have the opportunity to learn of this most versatile and useful—but also dangerous—tool. At this dedication it is fitting that we offer a prayer that as trained craftsmen each of you understand and use this tool carefully and with wisdom in the tasks of leadership ahead, which belong to your generation of educated men.

RESEARCH INSTITUTE FOR ADVANCED STUDY (RIAS)
BALTIMORE, MARYLAND

NSF PROGRAMS FOR HIGH SCHOOL STUDENTS: SOME CHANGES AND THE NEW CCSS PROGRAM

EUGENE A. ZIMPFER, S.J.

In a recent issue of the *Jesuit Educational Quarterly* (January, 1960) I reviewed the then current NSF programs for high school students and summarized the statistics gathered from the Jesuit high schools on their participation in these programs. Since this BULLETIN is planning a more comprehensive survey of the science programs in our schools, this article will limit itself to information on the NSF programs for secondary schools in general.

NSF programs discontinued or curtailed. The NSF has discontinued support for the Travelling Science Libraries (paperbacks) at the high school level and for the Travelling Science Lecture Demonstration Program. Like many NSF programs, these were intended to fill a temporary need, while stimulating and offering a pattern for schools and school systems to imitate at their own initiative and expense. They have served their purpose.

With NSF support, many state academies of science continue to conduct Visiting Scientist programs. The four national professional societies (AIBS, ACS, MAA, AIP) also receive support in running such programs in states where state academies are not meeting the need.

More summer programs. In the summer of 1959 there were 106 grants for the Summer Science Training Program (SSTP) for secondary school students. Last summer there were 154 involving 5,948 students. (Figures given for 1962 are based on those in the budget estimates given the NSF; actual attendance was a little higher.) In addition, 815 students attended

the new Cooperative College-School Science (CCSS) programs at seventeen program centers. In all, 154 colleges, universities and private research organizations were involved as sponsors. The CCSS program was introduced for the first time this past summer.

The purpose of the SSTP is to bring outstanding secondary school students, usually after their junior year, into direct contact with college teachers and research scientists of recognized competence, and to provide educational experiences in science and mathematics distinct from those available in high school courses. Frequently enough these experiences and contacts exceed in impression and quality those available at the college level. The program courses are not advanced placement courses. When the program takes the form of classroom and associated laboratory or project work, it consciously avoids material that would be repetitive of high school or early college courses. The programs which emphasize research participation may or may not involve classroom courses, but all of them involve the student as a junior associate of a research team or as principal investigator on a problem of appropriate difficulty under the *direct* supervision of an experienced research scientist.

Both the SSTP and the CCSS make adequate provision for the selection of participants independently of their financial status. Some directors operate their program for commuting students only, but the majority provide funds to cover room, board and travel (0 to 100% according to the student's need) for students from neighboring cities and states. Where the program is of a rare variety (oceanography, ecology, psychology, history of science, etc.) exceptional students may be accepted from very distant states. The allowed normal travel allotment maximum is 1500 miles, round trip at four cents per mile.

The CCSS program. A CCSS program is in effect a partnership between an institution of higher learning and a set of secondary schools whereby teachers and students, under the direction of college educational or research staff members, concentrate on science offerings designed to enrich the content of science studies in their parent high school. Instruction and guidance in "content" subjects are given by the college to the high school students and their teachers. The group usually consists of about forty superior students from various schools and about six high school teachers, selected on the basis of their ability to respond to the high level programs in question. The teacher-participants are given opportunities to take a part in the instructional process of the classroom-lab or research participation type program insofar as such practice may help them toward improving the courses they give at their home high school.

As in the SSTP, CCSS directors may accept at their own discretion com-

muting students only or students from near or far. Room, board and travel allowances are provided by the NSF. Subject areas range from the usual four high school sciences to the more rare disciplines using the scientific method, such as zoology and nuclear engineering.

The CCSS type program is also used by some institutions of higher learning to prepare or test students and high school teachers for the introduction of new courses such as the SMSG, PSSC and CBA into their high schools. Some also use these new course materials as the framework for giving the participants something beyond what is available in high school and early college courses.

Curriculum improvement planning. Starting in 1963, the NSF, under its CCSS budget, will also give grants to institutions of higher learning to sponsor and contribute staff members to secondary school systems' planning efforts related to improvement of science courses, especially those designed for the superior science or mathematics student. As in the other programs mentioned above, grants may be for the summer or for an academic year. The purpose is to bring administrators and selected teachers from the schools of a school system or group into prolonged contact with the most competent scientists and teachers at the college and university level for the purpose of improving science instruction and related programs for superior students in the high schools. The program does not intend to support writing of new courses or texts, but may easily result in the construction or revision of syllabi.

A typical situation might bring together a professor from each of the disciplines involved, a superintendent and selected science and mathematics teachers for meetings planned with the following goals in view.

1. To acquaint the high school people with the available materials and methods such as those of the SMSG, PSSC, and CBA.
2. To make the institutions of higher learning aware of where they might best concentrate their efforts to help the high schools.
3. To work out the selection of courses, timing of their adoption, and adjustments to the given situation.
4. To evaluate the competence of the high school teaching staff for handling the new courses.
5. To plan an NSF Summer Institute for Teachers, e.g., to prepare them to teach the PSSC course.
6. To plan a CCSS program for superior students and their teachers along the lines of the programs introduced in 1962 (see above) as a bridge between present courses and the new ones.
7. To write a detailed new syllabus or a detailed proposal to be submitted to school system authorities.

Participants in such programs may be alloted stipends up to $20 per day at the director's discretion if their services to the program constitute an undertaking beyond their normally compensated duties.

Further details on setting up the above programs at an institution of higher learning may be obtained from the National Science Foundation, Washington 25, D.C.

The NSF also issues detailed listings of program centers for all its summer institutes and programs around the first of January each year. Teacher and student applications for participation, however, are handled exclusively by the directors at the individual colleges or research centers. In general it is necessary to write to these directors for posters, brochures and application blanks, since they can hardly be expected to have every school in their state, let alone the 50 states, on their mailing list.

Pertinent Brochures

These brochures are available from the National Science Foundation, Washington 25, D. C.:

Summer Science Training Programs For High-Ability Secondary School Students: issued around January of each year; lists director's name, address, type of program, subjects of study, duration and other limits of each individual program. In 1962 this also included the seventeen summer CCSS locations. The academic year counterparts of both SSTP and CCSS were not listed.

SSTP-SSS: Suggestions for Preparation of Proposals: issued in the preceding summer for summer programs; details of policy, budget, etc.

CCSS Program for Secondary School Students and Teachers, Suggestions for Preparation of Proposals: issued well before the September 1 deadline for summer and academic year program proposals by directors.

Announcement SSTP and *Announcement CCSS:* short colorful forms of the preceding *Suggestions*; sent out to colleges and research organizations.

Acknowledgment

The statistics and policy statements reproduced in this article were graciously supplied by Mr. Arthur F. Scott, Head, Special Projects in Science Education, NSF.

Woodstock College

REPORTS OF SCIENTIFIC ACTIVITY

High Schools

Boston College High School. A revised science program this year begins with the sophomores starting a curriculum of a year and a half of chemistry followed by a year and a half of physics. The chemistry course will be the CHEM Study Course, while the physics course will retain the PSSC program. All science students must take German as a modern language. As a complement to this revised science curriculum, the mathematics department will follow the SMSG program in all four years.

Among recent additions to the science facilities are an overhead Vu-Graph projector and a fume hood to be used for lecture demonstrations. It is also hoped that ground breaking exercises will take place in the spring for a new science building.

Mr. Simon Miller, formerly of the mathematics department, is the new instructor of physical science. He brings to his work a number of years of experience as a chemical engineer in industry.

St. Joseph's Preparatory School. Fr. Stephen A. Garber, S.J., has received a grant for $750 from the Heart Association of Southeastern Pennsylvania. This grant will enable some of his students to make an "Evaluation of the influence of race, sex, and age on the cholesterol count of the blood." Fr. Garber is also president-elect of the Philadelphia Science Teachers' Association, and has recently completed a laboratory manual for the regular chemistry classes.

Sixteen students took the advanced placement tests in chemistry. Twelve received a score of three or better, and one received a five, a perfect score.

Colleges and Universities

Boston College. A new opportunity for advanced studies for academically talented high school students was inaugarated at Boston College in September. Classes in inorganic chemistry and elementary Russian will be given on Saturday mornings throughout the 1962–63 academic year. Students will be granted credit on the basis of their performance.

Geology. A number of undergraduate geology majors worked in various aspects of geology during the past summer. George Saulnier did drafting for Dr. Marland P. Billings of Harvard University and also worked for the United States Geological Survey, collecting information and data on boring sites in the Boston area. Under sponsorship of the NSF, Randolph Martin studied correlations of the surface geology of the Wachusett-Marl-

boro Tunnel with theories of the surface structure. Joseph McKniff, as a participant in a summer program sponsored by Geophysical Services, Inc., worked with a refraction crew in Uvalde, Texas.

Michael Peerzada has completed his graduate work in geophysics. His thesis is entitled "Tectonophysics of the Himalayas."

Fr. James W. Skehan, S.J., was elected president of the Boston College Sigma Xi Club and was re-elected Secretary-Treasurer of the Boston Geological Society.

Eight geology students participated on a field trip through New York, New Jersey, and Pennsylvania, in order to become acquainted with the geologic formations and structures which have not undergone metamorphism. The trip was preceded by a preview of the fossils of the area and the study of a relief geologic map of the area in the New York Museum of Natural History. A number of excellent fossils were collected on the trip.

Chemistry. A three year research program in the uses of fluorine in the combustion of rocket fuels will be conducted at Boston College under an Air Force grant of $120,000. Dr. Robert F. O'Malley, chairman of the chemistry department, has had previous experience with fluorine and will be director of the program. He will be assisted by graduate students. Fluorine has a higher energy per unit weight than oxygen and its use would provide a rocket fuel which would burn more efficiently. However, fluorine is highly corrosive and the problem to which the research is directed is finding a suitable combination of nitrogen and fluorine which will retain the value of the latter as a combustible and yet make it easier to handle.

Canisius College. The Sixth Annual Infrared Spectroscopy Institute was held at Canisius College, August 27–31. The institute sessions were geared to the needs of industrial personnel and covered the elementary and advanced theory of infrared spectroscopy, its industrial applications, and its future in research and industry. Lectures were given in a variety of fields, including group theory, nuclear magnetic resonance spectroscopy, and Raman spectroscopy.

Holy Cross College. Fr. Joseph A. Martus, S.J., who has been in the chemistry department for more than ten years, has succeeded Fr. Bernard A. Fiekers, S.J. as department chairman.

Chemistry. Fr. Fiekers represented the Central Massachusetts Section of the American Chemical Society at the national meeting in Atlantic City in September. He also spent two months in Europe evaluating the Holy Cross Junior Year Abroad program.

Dr. William F. O'Hara, a physical chemist from the University of Virginia with post-doctoral experience at the Carnegie Institute of Technology, recently joined the department. Dr. A. Van Hook is on sabbatical

leave during the fall semester in order to do work under Dr. Henry Eyring at the University of Utah.

An AEC grant of $10,000 has provided for the purchase of additional scalers and auxiliary equipment for the department.

Some curriculum changes have been made, the most important of which are the introduction of advanced courses in senior year, as recommended by the American Chemical Society, and the provision for qualified undergraduates to enroll in graduate courses.

Mathematics. Four mathematics majors have benefited from an undergraduate research grant received from the NSF. Three will study topological methods in algebraic geometry under the direction of Dr. Patrick Shanahan and Dr. Vincent McBrien. One will work with Dr. William Hartnett on a study of rings of continuous functions. Last year's experience with this program indicates that it is well designed to inculcate habits of genuine scholarship in the undergraduate.

An NSF in-service institute for forty junior and senior high school teachers began on September 17 and will continue weekly until the end of May.

Two members of the department expect to have books published in January 1963. Experimental editions of these texts have been used in the freshman year at Holy Cross for the past four years. Dr. William Hartnett is the author of *Principles of Modern Mathematics (Book I)* which will be published by Harper and Row; Dr. Patrick Shanahan is the author of *Introductory College Mathematics* which will be published by Prentice-Hall.

St. Joseph's College. Fr. John S. O'Conor, S.J., chairman of the physics and mathematics departments, spent six weeks of the summer visiting various research centers for physics in Europe. Among the locations inspected were the research laboratories of the Faculty of Science at Orsay, France; the common research center of Euratom at Ispra, near Milan; the National Synchrotron Laboratory at Frascati; the Vatican Astronomical Observatory at Castel Gandolfo; the 28 billion electron volt proton synchrotron of the European Organization for Nuclear Research in Geneva.

St. Peter's College. Eight of the twelve chemistry majors who graduated in June were awarded fellowships and assistantships for various graduate schools throughout the country. The twenty-nine awards came from Brooklyn Polytechnic, Colorado, Delaware, Illinois Institute of Technology, Maryland, Massachusetts State, Michigan, New Hampshire, Notre Dame, Wayne State, and Wisconsin. All of the eight winners, as well as one other student, are now pursuing graduate studies.

SCHOLASTICATES

Woodstock College. A number of theologians continued their research or took advanced courses during the past summer.

Astronomy. Mr. George V. Coyne, S.J. (*Md.*), after completing his doctoral studies at Georgetown, delivered a paper entitled "Comparative spectrophotometry of selected areas on the lunar surface" at a recent meeting of the American Astronomical Society held at Yale. An abstract of this paper follows.

During the months from September, 1961 to January, 1962, a Wadsworth spectrograph, giving a reciprocal dispersion of 4.9 A/mm on the normal to the grating in the first order spectrum, was used to obtain spectrograms of selected areas on the lunar surface. Identification of the observed areas was accomplished by photographing the slit plane image of the moon at the time the spectrograms were taken. The spectrograms were measured on a recording microphotometer in a direction transverse to the dispersion at approximately every 100 A, with a bandpass of 9.3 A. These measurements provide a densitometric profile across the observed lunar regions in which various small areas can be identified. From these profiles comparative spectral energy distribution curves of one area with respect to another are constructed. The results are given in the form of a color-contrast function, which is defined as the color-excess of one area of the moon with respect to another area, or the difference of their color indices. This function is normalized to a wavelength of 5500 A, so that the color indices are defined with respect to a variable wavelength, λ, and the wavelength, 5500 A. In general the curves show a smooth but non-monotonic variation with wavelength. The maximum values of the color-contrast function lie between $0^m.15$ and $0^m.20$. The lunar *maria* are more homogenous in blue light than in red light. On several curves and notably for lunar areas near the edges of *maria*, there are humps resembling luminescence bands observed by Dubois (*Publication de l'Observatoire de l'Université de Bordeaux*, Series A, No. 13, 1959) for various areas of the lunar surface. These bands are about 500 A wide and have an amplitude varying from $0^m.03$ to $0^m.18$ above the smooth curve on which they are superimposed.

Biology. Mr. Roland Lesseps, S.J. (*N.O.*) recently completed his doctoral studies at Johns Hopkins University. His dissertation, "Electron microscopy of dissociated and reaggregating embryonic chick cells," is abstracted below.

During animal embryogenesis the cells undergo extensive shifts in position. That these morphogenetic movements may be due to changing adhesive preferences of the cells is shown by tissue-dissociation experiments. Four different chemical procedures are commonly used to dissociate a tissue into single cells. To learn more about any ultrastructural alterations of the cell surface produced by these dissociation procedures, cells dissociated by trypsin, papain, EDTA, or pH 10 solutions were examined with the electron microscope. Dissociated cells have a surface unit membrane with dimensions similar to those of control unit membranes. Ferritin molecules attached to the surface of trypsin-dissociated heart cells are usually in direct contact with the surface

unit membrane. These observations lead to the conclusion that the four dissociation procedures employed in this study do not cause any damage to the surface unit membrane detectable in electron micrographs, but probably attack the "gap substance."

One theory of cell adhesiveness proposes that calcium bridges between apposed cell surfaces bind cells together. Another suggests that cells are stabilized at separations of 100–200 A by the interaction of attractive and repulsive forces. The present investigation shows that surface projections with a radius of curvature of the order of 0.1 microns are present on dissociated and reaggregating cells. The repulsive energy between cells with such surface projections is less than this repulsive energy would be if the cells had smooth surfaces. The conclusion is drawn that is possible for cells to approach to 5–10 A of one another, permitting the formation of calcium bridges between adjacent cell surfaces. Reaggregating cells make initial contact at these surface undulations, and then the apposed surfaces are "zipped" together and run parallel to one another as in control tissues.

Mr. Anthony P. Mahowald, S.J. (*Wisc.*) also received his Ph.D. in biology from Johns Hopkins University this past summer. His dissertation, "Electron microscopy of early embryogenesis in *Drosophila melanogaster*," was abstracted in the June, 1962, issue of this BULLETIN (pages 55–56).

Fr. George D. Ruggieri, S.J. (*Md.*) spent the summer at the department of marine biochemistry and ecology, New York Aquarium, continuing research on the extraction of pharmacodynamically-active substances from marine organisms. He also collaborated with Dr. John McLaughlin of the Haskins Labs Inc., New York, on the effects of dinoflagellate cultures and toxins on a developmental system. Studies on the effects of various tranquilizers and related drugs on embryogenesis were conducted in collaboration with Dr. Eli Goldsmith of New York University. The above studies were supported by the Office of Naval Research.

Mr. Victor Jaccarini, S.J. (*Malta*) attended a six week's course in experimental marine embryology at the Marine Biological Laboratory, Woods Hole, Mass. He received a grant from the laboratory to cover tuition, travel and living expenses.

Chemistry. Mr. Ramon A. Salomone, S.J. (*N.Y.*) recently completed his doctoral studies at Fordham. He delivered a paper at the annual meeting of the American Chemical Society in September before the division of Agricultural and Food Chemistry. The paper was entitled "The synthesis and toxicity of some prolan analogs." The abstract of Mr. Salomone's dissertation appeared in the March, 1962 issue of this BULLETIN (pages 26–27).

Mr. James F. Salmon, S.J. (*Md.*) spent the summer at the University of Pennsylvania, working with Professor E. Charles Evers' group on an AEC contract. The research was concerned with mechanisms underlying equilibrium reactions between ions and ion-pairs in solutions of electrolytes.

Mr. Salmon worked on the conductance properties of tetra-n-butylammonium thiocyanate in o-dichlorobenzene. This was part of a general program designed to test how well the laws for dilute solutions of electrolytes (based on the theories of Debye-Hückel, Onsager, and Bjerrum) can be extended to more concentrated solutions of electrolytes.

Mathematics. Mr. G. Harry Hock, S. J. (*Md.*) spent the summer at the University of California at Los Angeles at an institute for college mathematics teachers. Mr. Hock studied numerical analysis.

Fr. William Keyes, S.J. (*N.Y.*) studied mathematics at an NSF summer institute at Georgetown.

Physics. Mr. Timothy Toohig, S.J. (*N.E.*) recently completed his doctoral studies at Johns Hopkins University. The subject of his dissertation was "The existence and production of the eta and omega mesons". The research for the dissertation included the discovery of the eta meson of mass 546 mev, and confirmation of the discovery at Berkeley of the omega meson of mass 780 mev. A series of papers by the high energy physics group at Johns Hopkins in collaboration with a Northwestern University group has discussed their work of which an early abstract appeared in the December, 1961 issue of this BULLETIN (pages 97–98).

The role that these particles play in the scheme of elementary particles is not clear at present. Any theoretical understanding of this role must wait for further experimental data, especially for clarification of the status of a number of possible additional particles or resonances which are possibly seen in this data and data from many other laboratories.

Mr. Robert Brungs, S.J. (*Md.*) spent the summer as a temporary research associate in the solid state sciences division at Argonne National Laboratories. Assigned to the graphite research group, he was engaged in an attempt to grow single crystals of c-axis graphite. Although a-axis graphite is relatively easy to grow and its properties are well-known, c-axis graphite is quite difficult to grow because of its very weak bonding forces. The properties of c-axis graphite are strongly controverted and large single crystals of this type of graphite are needed for experimental work. Since graphite dissolves only in a molten metal matrix, as far as is known, the problem was basically one of establishing gradient-free conditions in the melt at high temperatures.

Mr. James Dehn, S.J. (*N.Y.*) spent the summer at the Bureau of Mines Metallurgy Research Center in College Park, Maryland. He investigated the optical properties of ceramic materials with emphasis on emissivity, and planned an experiment to measure the elastic properties of solids using ultrasonics.

Mr. Robert C. Hogan, S.J. (*N.Y.*) was one of forty-four high school science teachers who took part in the Fordham University NSF Summer

Institute based on the textbook, laboratory apparatus and experiments, and films that make up the the PSSC high school physics course. Mr. Francis Maciorowski, S.J. (*Md.*) took graduate courses in mathematics at Fordham during the past summer.

Graduate Studies and Research

Fordham University. Fr. Richard T. Cronin, S.J. (*Upper Can.*) took summer courses in computer logic at St. Mary's University in Halifax, Canada; in marine ecology at Woods Hole in Massachusetts; and in radioisotope methodology and advanced radioisotope techniques at the Oak Ridge Institute for Nuclear Studies in Tennessee.

Among the new arrivals at Spellman Hall are the following scientists: Fr. Yvon Pageau, S. J. (*Lower Can.*) who will work on his M.S. in biology at Fordham while preparing for studies in paleontology. Fr. Alan McCarthy, S.J. (*N.Y.*) returns to Spellman Hall to work for his Ph.D. in biology. Mr. Edward F. Cavey, S.J. (*Md.*) and Mr. Charles J. Zimpfer, S.J. (*Buff.*) are both working for their M.A. degrees in mathematics.

Harvard. Mr. Lawrence Conlon, S.J. (*Mo.*) and Mr. Victor Manjarrez, S.J. (*Cal.*) both expect to receive their Ph.D. degrees in mathematics this academic year. A summary of Mr. Conlon's research in the field of differential topology is given below:

> This research is a continuation of the work of Bott and Samelson on the applications of Morse theory to symmetric spaces. If K is a symmetric subgroup of the compact Lie group G (i.e., the fixed point group of an involution of G) then $M = G/K$ is a symmetric space. The topology of the loop space L(M) can be studied via the Morse theory and the above mentioned authors have completely described the mod 2 homology $H_*(L(M);Z_2)$ in terms of the geodesics in L(M). To obtain information about the integral homology it is necessary to determine the structure of certain manifolds—the Bott K-cycles—while are canonically imbedded in L(M). The main result of the present research is a complete structure theorem for these K-cycles. An important corollary is that the infinitesimal root diagram of M contains no singular planes of weight one, than the integral homology $H_*(L(M);Z)$ is free-abelian. In particular, the mod 2 theorems of Bott and Samelson will hold true for these spaces without the mod 2 restriction.
>
> Another set of results proceeds in the following direction. If H, K are symmetric subgroups of G, then let N be an orbit on G/K under the natural action of H. In principle the topology of the space L(M;p,N) of paths in M from a point p to N can be studied via the theorems of Bott and Samelson, but to do this effectively, requires an algorithm for computing the Morse indices of geodesics in L. By a theorem of Bott this reduces the problem of determining the deficiency of H-orbits in M. An effective algorithm for this is given and applied to determine homotopy approximations to certain rather complicated spaces of paths.

The research carried out by Mr. Manjarrez is summarized as follows:

In his paper of 1949, *Sur les bases de polynomes quelconques*, J. M. Whittaker defined the notion of *effectivity* for sequences of polynomials, a sequence (p_n) being effective if any function, f, analytic on the closed unit disk of the complex plane, can be expanded in the form

$$\sum_{n=0}^{\infty} b_n p_n$$

where the b_n are calculated from the Taylor development of f about the origin and the matrix arising from the expression of the functions (Z^n) in terms of the (p_n). We generalize the work of Whittaker to the case of functions analytic on any compact set in the plane whose complement can be mapped conformally, though perhaps not single-valuedly, onto the exterior of the unit disk with the points at infinity corresponding.

Next we show that any effective sequence of polynomials gives rise to maximal convergence in the sense defined by J. L. Walsh, that is, convergence like that of a geometric series. We prove Ostrowski's gap theorem for all expansions in terms of an effective sequence of polynomials, and prove that an orthogonal sequence of polynomials is effective. We also extend these results to the case of approximation by rational functions.

Massachusetts Institute of Technology. Mr. Robert R. Dobbins, S.J. (*N.Y.*) continues his studies in theoretical physics. A preliminary description of his thesis is given here:

A two dimensional relativistic field theory similar to the Thirring model is considered. However, the theory deals with non-zero mass particles, thereby avoiding the infrared difficulties of a model such as Thirring's. We are attempting to confirm the conjectures made by Federbush on this model and to specify its solution if this should prove possible.

The interaction is that of two fermion currents, $\epsilon_{\mu\nu} j_1^{\mu}(x) j_2^{\nu}(x)$ where $\epsilon_{\mu\nu}$ is the completely antisymmetric unit tensor. The Dirac algebra in two dimensions affords cancellations not present in the four dimensional case. In particular, preliminary investigations seem to indicate that the only ultraviolet singularities present in the model are those of the self energy type in Z_2. Other singularities appearing in individual terms cancel one another when all Feynman diagrams of a given class are taken together. Moreover, as in quantum electrodynamics, the requirement of gauge invariance makes further simplifications in treating possible divergent terms.

At present, the treatment of the model is totally by perturbation theory. But it is possible to derive some dispersion relations that will be more fully investigated. Again, it has been possible to derive an integral equation with known kernel for the four point function. There is some hope of going beyond perturbation methods in solving this equation.

CORRESPONDENTS FOR THE BULLETIN

Listed below are the correspondents who have been and will be gathering material for the "Reports of Scientific Activity" section of the BULLETIN. Coverage, except for some individual graduate students, would seem to be as complete as possible at the present time. (If not, let us know!) It would be much appreciated if the graduate students not covered below would send in individual reports for inclusion in the BULLETIN.

The news editor of the BULLETIN would like to take this opportunity to thank publicly all of the correspondents who have generously supplied us with material in the past, and we look forward to receiving help from them in the future.

HIGH SCHOOLS

Boston College High School: Mr. John A. Hanrahan.
Brooklyn Preparatory School: Fr. Joseph G. Musselman.
Canisius High School: Fr. Frederick J. Reisert.
Cheverus High School: Fr. John J. Conklin.
Cranwell Preparatory School: Fr. James W. O'Neil.
Fairfield College Preparatory School: Fr. Eugene C. Brissette.
Fordham Preparatory School: Mr. Raymond S. McCormick.
Georgetown Preparatory School: Mr. Lawrence H. Jones.
Gonzaga High School: Fr. Robert F. Mullan.
Loyola High School (Balto.): Fr. Francis J. Nash.
Loyola School (N.Y.): Fr. Robert Haskins.
McQuaid High School: Fr. William H. McBride.
Regis High School: Fr. Timothy Reardon.
St. Joseph's College High School: Fr. Stephen A. Garber.
St. Peter's High School: Mr. Donald G. Dzamba.
Scranton Preparatory School: Fr. Neil P. McLaughlin.
Xavier High School (Concord, Mass.): Fr. John B. Kerdiejus.
Xavier High School (N.Y.): Mr. Joseph S. Rooney.

Overseas

Baghdad College: Fr. John Joseph McCarthy.
St. George's College: Mr. John E. Surette.

COLLEGES AND UNIVERSITIES

Boston College

Biology: Fr. William D. Sullivan.
Chemistry: Fr. John R. Trzaska.
Geology: Fr. James W. Skehan.

Mathematics: Fr. John F. Caulfield.
Physics: Fr. William G. Guindon.

Canisius College
Biology and Chemistry: Fr. Paul J. McCarthy.
Mathematics and Physics: Fr. James J. Ruddick.

Fairfield University
Biology and Chemistry: Fr. Robert E. Varnerin.
Mathematics and Physics: Fr. James W. Ring.

Fordham University
Chemistry: Fr. Robert D. Cloney.
Mathematics: Fr. Charles J. Lewis.
Physics: Fr. Joseph F. Mulligan.

Georgetown University
Biology: Fr. James L. Harley.
Chemistry: Fr. John J. Burns.
Mathematics and Physics: Fr. Matthew P. Thekaekara.
Observatory: Fr. Francis J. Heyden.
Medical Center: Fr. Mark H. Bauer.

Holy Cross College
Biology: Fr. Joseph F. Busam.
Chemistry: Fr. Bernard A. Fiekers.
Mathematics: Fr. John J. MacDonnell.
Physics: Fr. James K. Connolly.

Le Moyne College
Biology: Fr. Francis X. Flood.
Chemistry: Fr. John J. O'Brien.
Mathematics and Physics: Fr. Robert O. Brennan.

Loyola College
Biology: Fr. Joseph A. Burke.
Chemistry, Physics, and Mathematics: Fr. Edward S. Hauber.

St. Joseph's College
Biology: Fr. Francis J. MacEntee.
Chemistry and Physics: Fr. John S. O'Conor.
Mathematics: Fr. Frederick C. Koehler.

St. Peter's College
Biology: Fr. Jerome Gruszczyk.
Chemistry, Mathematics, and Physics: Fr. Arthur G. Kehoe.
Mathematics: Fr. Robert I. Canavan.

Scranton University
Biology and Chemistry: Fr. Paul J. Casey.
Mathematics and Physics: Fr. Edwin R. Powers.

Wheeling College

Biology: Fr. Joseph B. Hanzely.

Chemistry, Mathematics, and Physics: Fr.Joseph A. Duke.

Overseas

Al-Hikma University: Fr. William J. Larkin.
Ateneo de Manila: Fr. William J. Schmitt.
Manila Observatory: Fr. Paul B. Hugendobler.
Japan: Fr. Daniel McCoy.

SCHOLASTICATES

Shrub Oak: Fr. James Fischer.
Spring Hill: Mr. Robert J. Paradowski.
Weston: Mr. Donald Plocke.
Woodstock: Mr. James F. Salmon.

GRADUATE STUDIES AND RESEARCH

Calvert Street (Johns Hopkins): Mr. William H. Millerd.
Carroll House (Catholic University): Mr. Florian A. Muckenthaler.
Gesu (University of Pennsylvania): Mr. Roger C. Phillips.
Newbury Street (Harvard, MIT): Mr. Robert R. Dobbins.
St. Louis University: Mr. Robert F. O'Brien.
Spellman Hall (Columbia, Fordham, NYU, Yeshiva): Mr. James F. O'Brien.
Weston Observatory: Mr. David M. Clarke.

OFFICIAL REPORTS AND NOTICES

The 1962 Meeting at Scranton

First General Meeting

Rev. James L. Harley, S.J., President of the Association, called the meeting to order at 7:30 P.M., August 28, in Room 100 of the Loyola Hall of Science.

Rev. William G. Kelly, S.J., Academic Vice-President of the University of Scranton, was introduced by Fr. Harley. Fr. Kelly, representing the Very Rev. John J. Long, S.J., Rector of the University, welcomed the delegates to the Scranton campus, gave a brief history of the University and invited the delegates to inspect the many new buildings on the campus.

Fr. Harley opened the business meeting by asking that the Secretary's report be accepted as published in the Bulletin, vol. 38, no. 4, December 1961. A motion was made, seconded, and carried that the Secretary's report be accepted as published.

Fr. Harley announced the nominating committee: Fr. Bernard Fiekers, Fr. Robert Brennan, and Fr. Francis Haig; and the resolutions committee: Fr. Frederick Dillemuth, Fr. Gerald Hutchinson, and Fr. Richard Harper.

Fr. Harley then announced the agenda for the final business meeting on August 30: a report from the Editor of the Bulletin, a report from the Treasurer, a report on elections from section chairmen, a report from the nominating and resolutions committees, and the election of a President.

No other business came before the house.

Fr. Harley's presidential address, "Cell and Tissue Culture" was interesting and well received.

The meeting adjourned at 8:30 P.M.

Final General Meeting

Fr. Harley called the final general meeting to order at 9:30 A.M., August 30. It was held in Loyola Hall of Science, Room 100.

By way of appreciation, Fr. Harley gave a resume of the work done by Fr. Reilly, Fr. Osterle, and Fr. Vetz of the University of Scranton in making arrangements for the meeting.

The Treasurer's report was read. It indicated that as of August 17, 1962, the Association had a positive balance on hand amounting to $2,762.42. A motion was made and carried that the Treasurer's report be accepted as read.

Fr. Harley called for the section chairmen to report on election of officers in each section. The biology section reported that Fr. James L. Harley was elected as chairman and Mr. James O'Brien as secretary. The chemistry, physics and mathematics sections each reported that no election was held because no change of officers was due. The philosophy of science section reported that it had not elected a new chairman but would do so as soon as possible.

Fr. Dillemuth read the following report of the Committee on Resolutions:

> The members of the American Association of Jesuit Scientists (Eastern States Division) assembled at the University of Scranton for their thirty-seventh annual meeting hereby resolve:
>
> 1. That they are sincerely grateful to Very Reverend John L. Long, S.J.,

President of the University of Scranton, for his generosity in inviting the Association to meet at Scranton this year, and to Rev. William Kelly, S.J., Academic Vice-President, for his cordial welcome on behalf of the President, and to Reverend Donald Reilly, S.J., Minister of the University of Scranton, Reverend William Osterle, S.J., and Reverend Joseph Vetz, S.J., for the efficient arrangements for their stay on the Scranton campus.

2. That they are sincerely grateful to Reverend James F. Smith, S.J., Editor, and his colleagues for their excellent work in publishing the BULLETIN.

3. That the President of the Association write a letter of condolence to Reverend Arthur Kehoe, S.J., chairman of the chemistry section of the Association, on the recent death of his mother.

4. That the President of the Association write letters of congratulations to the following jubilarians of the Association: Reverend Joseph M. Kelley, S.J., on the occasion of his sixtieth anniversary as a Jesuit; Reverend Henry M. Brock, S.J., and Reverend Joseph S. Didusch, S.J., on the fiftieth anniversary of their ordination to the priesthood; Reverend Thomas P. Butler, S.J., on his golden jubilee in the Society.

Frederick J. Dillemuth, S.J.
Gerald F. Hutchinson, S.J.
Richard H. Harper, S.J.

A motion was made and passed that the resolutions be accepted as read.

Fr. Smith, Editor of the BULLETIN gave a report on the BULLETIN. He thanked Fr. Francis Haig, Fr. James Gaffney, and Mr. Charles Currie for their work on the BULLETIN. He reported that at present there was no copy except news items for the BULLETIN and that the September issue would consist entirely of news items.

Fr. Harley observed that since by the Constitutions the Executive Council is the Board of Associate Editors of the BULLETIN, a member could contribute copy to the BULLETIN through his sectional chairman.

Fr. Fiekers read the following report of the Committee on Nominations: Fr. James W. Skehan of Boston College is nominated for President of the Association.

A motion was made and carried that nominations be closed.

Fr. Skehan was elected unanimously.

Since Fr. Skehan had to leave before the final meeting, Fr. Harley conducted the remainder of the meeting which was concerned principally with a discussion of permission required for scholastics to attend the annual meeting.

Fr. Persich asked if a letter could be written by the President of the Association to the Provincial concerned asking that regents at Villa be allowed to attend the annual meeting.

Fr. Harley replied that there would probably be a meeting of the Executive Council during the year to set up the schedule of the meeting at an early date. In this way it was hoped that such conflicts could be avoided.

Mr. Eugene Zimpfer mentioned that many theologians at Woodstock who had been involved in teaching science or mathematics during regency but who did not have graduate degrees would like to attend the meeting. He suggested that the contact with teachers at the meeting would be very helpful to the theologians.

Fr. Ruddick concurred, mentioning that attendance at the annual meeting is a stimulus to enthusiasm of regents and theologians.

Fr. Harley suggested that the Prefects of Studies of the four eastern provinces should be invited to the meeting.

Fr. Reardon suggested that if the Prefects of Studies cannot attend, they be asked to urge attendance of members during their visits to the high schools and colleges.

Fr. Smith suggested that present wording of permission for theologians be changed to read: "... theologians with a doctorate or who will read a paper ...". This had been the wording a few years ago. In this way more theologians would be able to attend.

Fr. Harley announced that the Executive Council would discuss the possibility of writing to the Fathers Socius of the respective provinces requesting that summer assignments of regents not conflict with the meeting.

No other business came before the house.

A motion was made and carried and that the meeting be adjourned.

The meeting adjourned at 10:10 A.M.

REV. JOHN MACDONNELL, S.J., *Secretary*

PROGRAM OF THE SECTIONS

Biology. Wednesday, August 29, 1962.

1. *Alkaline phosphatase of E. Coli: a zinc metalloenzyme.* Mr. Donald Plocke, Weston College.
2. *A summer seminar in biological sciences at Gonzaga High School.* Fr. Robert Mullan, Gonzaga High School.
3. *Reports on Graduate Studies:*
   a. *Catholic University.* Mr. Florian Muckenthaler.
   b. *Fordham University.* Mr. James F. O'Brien.
   c. *Massachusetts Institute of Technology.* Mr. Donald Plocke.
4. *Discussion:*
   a. *The Biological Sciences Curriculum Study.*
   b. *NSF summer institutes and conferences.*
   c. *College preparation for graduate work in biology.*
   d. *The pre-medical and the biology major courses.*

Chemistry. Wednesday, August 29, 1962.

1. *Two new experiments for the general chemistry laboratory: An equilibrium constant determination and the solubility product constant of copper II iodate.* Fr. Paul J. McCarthy, Canisius College.
2. *Demonstrations of the gas laws.* Fr. Alvin Hufnagel, Canisius High School.
3. *A novel representation of electron orbitals.* Mr. William G. Aylward, Fairfield Preparatory School.
4. *Determination of deuterium by infra-red analysis.* Mr. James L. Lambert, Johns Hopkins University.
5. *1,3-dipolar cycloaddition: a new type of organic mechanism.* Fr. Charles J. Thoman, University of Massachusetts.
6. *High-energy photochemistry.* Mr. Charles L. Currie, Woodstock College.
7. *A springboard for discussion: the revised ACS minimum standards for the undergraduate curriculum.* Fr. Arthur G. Kehoe, St. Peter's College.
8. *The approach of one college to curriculum revision.* Fr. Gerald Hutchinson, Fairfield University.
9. *Present status and future trends of advanced placement: a report of the RPI conference on advanced placement.* Fr. George J. Hilsdorf, St. Peter's College.
10. *The national high school chemistry programs:*
    a. *Chemical Education Materials Study (CHEMS).* Fr. Joseph Musselman, Brooklyn Preparatory School.
    b. *Chemical Bond Approach (CBA).* Fr. Raymond Feuerstein, University of Detroit High School.

11. *General discussion: the relation of the high school and first year college chemistry course.*

12. *New films for teaching: Synthesis of an organic compound.*

Mathematics. Wednesday, August 29, 1962.

1. *SMSG mathematics library—content and school use:*
   a. *Numbers, rational and irrational.* Fr. Timothy Reardon, Regis High School.
   b. *Algebraic inequalities.* Fr. Francis O'Connor, Brooklyn Preparatory School.
   c. *Contest problem book.* Fr. Bernard Scully, Fairfield University.
   d. *What is calculus about?* Fr. Thomas Fleming, Canisius High School.
2. *Programmed calculus course at McQuaid.* Mr. Leo Gafney, McQuaid High School.
3. *Discussion on new algebra texts* by:
   a. *Nichols and Collins.* Mr. Charles Zimpfer, Fordham University.
   b. *Hayden and Finan.* Fr. William F. Doyle, Xavier High School, Concord.
4. *Report on Marquette's conference on calculus and linear analysis.* Fr. James Fischer, Loyola Seminary.
5. *Discussion on the SMSG geometry course.* Mr. Edward Cavey, Fordham University.
6. *MAA films* (one hour each): *Mathematical induction* and *Integration.*

Physics. Wednesday, August 29, 1962.

1. *Introductory remarks: fifth anniversary of the Rev. Charles E. Depperman, S.J.* Fr. James J. Ruddick, Canisius College.
2. *The Cambridge electron accelerator: its design and some of its experiments.* Mr. Albert Cone, Harvard University.
3. *The recommendations for physics majors: Committee for the Undergraduate Program in Mathematics (CUPM).* Fr. James J. Ruddick, Canisius College.
4. *The geology of the Wachusett-Marlboro tunnel, East-Central Massachusetts.* Fr. James W. Skehan, Boston College.
5. *Some new techniques in high school physics laboratory work and student projects.* Fr. Frederick J. Reisert, Canisius High School.
6. *Fitting the high school laboratory experiments to the equipment available.* Mr. Joseph S. Rooney, Xavier High School, New York.
7. *Some new mesons.* Fr. Robert O. Brennan, Le Moyne College.
8. *Joint Discussion (Mathematics and Physics Section): Are computers desirable and feasible in undergraduate colleges?* Fr. Robert A. Haus, Canisius College.

Science and Philosophy. Tuesday, August 28, 1962.

Informal discussion on Fr. Pierre Teilhard de Chardin, S.J.

OFFICERS OF THE ASSOCIATION

President: James W. Skehan
Boston College, Chesnut Hill 67, Mass.

Secretary: John J. MacDonnell
College of the Holy Cross, Worcester 10, Massachusetts

Treasurer: John S. O'Conor
St. Joseph's College, Philadelphia 31, Pennsylvania

Chairmen: James L. Harley, *Biology*
Georgetown University, Washington 7, D.C.

Arthur G. Kehoe, *Chemistry*
St. Peter's College, Jersey City 6, New Jersey

James J. Fischer, *Mathematics*
Loyola Seminary, Shrub Oak, New York

James J. Ruddick, *Physics*
Canisius College, Buffalo 8, New York

Walter J. Feeney, *Science and Philosophy*
Weston College, Weston, Massachusetts

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