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American Association of Jesuit Scientists

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OF THE

THIRTY-THIRD ANNUAL MEETING

September 2, 3 and 4, 1958

LE MOYNE COLLEGE

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EASTERN STATES DIVISION

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Manuscripts of NEWS ITEMS should be sent to the NEWS EDITOR: Rev. Bernard M. Scully, S.J., Cranwell Preparatory School, Lenox, Mass.

Program

33rd Annual Meeting **LeMoyne College**
Syracuse, N. Y.

Tuesday, September 2, 1958

7:30 P.M. FIRST GENERAL SESSION

Auditorium, Administration Building

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President of Le Moyne College

Business Meeting

Presidential Address

Jesuit Education and the Natural Sciences.
REV. JOSEPH F. MULLIGAN, S.J.,
Fordham University,
President of this Association

* * *

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7:30 P.M. SECOND GENERAL SESSION

Auditorium, Administration Building

Guest Speaker on Scientific Research and the Jesuit Research Council

MR. RALPH E. TRESE,
Executive Director,
Jesuit Research Council

Discussion Period

* * *

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Auditorium, Administration Building

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Director of the Weston College Seismological Observatory

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A New Introductory Physical Science Course
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* * *

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at Canisius College, Rev. James J. Ruddick, S.J.,
at St. Joseph's College, Rev. John S. O'Conor, S.J.

Secretary's Report

FIRST GENERAL SESSION

The thirty-third annual meeting of the American Association of Jesuit Scientists, Eastern States Division, was called to order by Father J. F. Mulligan, President, at 7:30 P.M. on September 2, 1958, in the auditorium of the Administration Building at Le Moyne College in Syracuse, N. Y. The President introduced the Reverend Robert F. Grewen, Rector of Le Moyne, who welcomed the members of the ASSOCIATION and the visiting scientists from the mid-west on behalf of his Community and personally thanked Father Mulligan and Father Robert O. Brennan for their unstinted efforts expended in preparation for the meeting.

A motion was made and carried to accept the minutes of the previous meeting, at Fairfield University, as published in the BULLETIN.

The following committees were appointed by the President:

Committee on Nominations: Fr. Guindon, Fr. Heyden, Fr. Flood;
Committee on Resolutions: Fr. Coniff, Fr. Busam, Fr. Hilsdorf.

The President recommended that the address of the guest speaker, Mr. Ralph Trese, on the JESUIT RESEARCH COUNCIL, serve as an occasion to resolve any difficulties or doubts that may have arisen from the previous meeting.

It was announced that Father Daniel Linehan would present an illustrated lecture on his geophysical explorations at the South Pole on Thursday, September 4, at 9:30 A.M. The Business Meeting originally scheduled for that hour would follow the lecture.

Father B. A. Fiekers suggested, in view of the extensive modernization programs already underway in the various sciences, that it would be advantageous to all if each section were to have prepared a summary of the programs and progress in their respective fields so that it might be published as a block. These reports will be of greater usefulness if they can be prepared immediately and appear in the first issue of the BULLETIN.

Father Mulligan gave an inspiring and informative presidential address, *Jesuit Education in the Natural Sciences.*

After the address, there being no further business, a motion to adjourn was made and carried. The meeting concluded at 8:35 P.M.

FINAL GENERAL SESSION

The final general session was called to order by the President on September 4, at 10:50 A.M. in the auditorium of the Administration Building.

The treasurer's report was read by Father J. S. O'Conor and it was voted that the report be accepted as read.

Father Fiekers spoke briefly on the BULLETIN and urged those who had contributed papers to send in their abstracts promptly. He requested the various sectional chairmen to be alert for suitable publication material to be derived from their meetings. Any suggestions on the conduct of the BULLETIN will be gratefully received and papers submitted for publication during the year most acceptable. Father Mulligan extended his congratulations to the Editor for his zealous efforts during the past year.

The results of the elections for the various sections were presented as follows—Biology: Chairman, Fr. William Sullivan, Secretary, Mr. Donald Plocke; Chemistry: Chairman, Fr. Clarence Schubert, Secretary, Mr. Robert Cloney; Philosophy and Science: Chairman, Fr. Walter Feeney, Secetary, Mr. Charles Currie.

The report of the resolutions committee was presented by Father J. F. Busam.

1. Be it resolved that the American Association of Jesuit Scientists, Eastern States Division, express its gratitude to the Very Reverend Robert F. Grewen, S.J., President of Le Moyne College, to

Reverend Eugene A. Gisel, S.J., Le Moyne's Father Minister and to the Le Moyne Community for their cordial reception and generous hospitality on the occasion of the first Jesuit Science Convention to be held on this beautiful campus.

2. Be it resolved that the ASSOCIATION express its gratitude to Reverend Joseph F. Mulligan, S.J., President, and to Reverend Robert O. Brennan, S.J., local chairman of arrangements, whose great generosity contributed so much towards making this meeting so enjoyable and profitable.

3. Be it resolved that the ASSOCIATION give its sincere thanks to Reverend Bernard A. Fiekers, S.J., Editor of the BULLETIN, for his continued labor in doing very well a difficult job.

4. Be it resolved that the ASSOCIATION extend its congratulations to Very Reverend Michael P. Walsh, S.J., former president of this ASSOCIATION and to Very Reverend Harry A. Boyle, S.J., on their appointments to the presidencies of Boston College and Xavier High School respectively.

5. Whereas this ASSOCIATION has on the death of Reverend Emeran J. Kolkmeyer, S.J., lost one of its most enthusiastic members, be it resolved that this ASSOCIATON express its profound regret at this loss and that the members commend to God the soul of this devoted Jesuit scientist.

6. Be it resolved that the secretary of the ASSOCIATION be instructed to send a copy of these resolutions to Very Reverend Father Rector and Reverend Father Minister of Le Moyne College, a copy of the congratulatory resolution to Very Reverend Father Walsh, S.J., and Very Reverend Father Boyle, S.J., and a copy of the resolution on Father Kolkmeyer, S.J., to his nearest relative.

(signed) ARTHUR A. CONIFF, S.J.
GEORGE J. HILSDORF, S.J.
JOSEPH F. BUSAM, S.J.

The report of the nominating committee was presented by Father Guindon. For president Reverend Joseph A. Duke of Wheeling College. Father Duke was elected by the unanimous vote of those present.

Father Mulligan on leaving the chair extended his special thanks to Father Brennan, to Mr. James Smith and Mr. Ernest Spittler for their untiring efforts on behalf of this meeting. Father Duke assumed the chair and called for a rising vote of thanks to Father Mulligan. There being no further business the meeting adjourned at 11:05 A.M.

Respectfully submitted,

JOHN H. KINNIER, S.J.
Secretary

President's Address

JESUIT EDUCATION AND THE NATURAL SCIENCES*

REV. JOSEPH F. MULLIGAN, S.J.

Fordham University

We live in an age of nuclear bombs, rockets to the moon, and electronic computing machines that play passable games of chess. The major portion of our nation's budget is being spent for such equipment, and there is every indication that such will be the case for many years to come. Rockets, nuclear energy, and space travel pose political and ethical problems for the rulers of the world which would have been unthinkable just a few years ago. We are troubled by questions like these: Should the nuclear bomb tests be continued? Is it worthwhile to spend a billion dollars to get a man to the moon, or would it be better to spend it on an impregnable radar defense system? In a democracy the people ultimately make the decisions, and therefore the people, and particularly the leaders of the people, must have the necessary knowledge on which to make informed decisions on these questions. As Professor Conant has put it:

> Because of the fact that the applications of science play so important a part in our daily lives, matters of public policy are profoundly influenced by highly technical scientific considerations. Some understanding of science by those in positions of authority and responsibility as well as by those who shape opinion is therefore of importance for the national welfare.[1]

This is precisely where we are failing today, and this failure may be disastrous for the future. The television advertisements and the astrology columns in the newspapers spell out how little comprehension our American people have of what science really is. And statements by some members of Congress do not proclaim any higher level of scientific literacy on their part. As Professor Stratton of M.I.T. has said:

> For now, and increasingly in the time to come, we are destined to live not only with ourselves but with the problems and with

* Throughout this paper by *natural sciences* we mean all the *pure* physical and life sciences, but not applied science or engineering. Mathematics is always meant to be included, even when this is not stated explicitly. Most italics in quotations have been supplied by the editor.

> the products of physics and chemistry and biology. It is inconceivable that we shall continue to understand either ourselves or our relations with one another if educated people remain in their present ignorance of the nature of science.[2]

There are really two distinct problems here. In the first place more and more scientists will be called on in the years ahead to help make policy decisions of great social and moral consequence for this country and for the world. Hence the need for broadly-trained scientists who are perceptive of philosophical and religious values. In the second place the electorate will be called on to vote on issues which depend intimately on some understanding of the facts and theories of science. Hence the need that every educated man know what science is, what it can and cannot do, and what are the basic facts and theories of the various scientific fields. For example, how can any American vote on the advisability of continuing nuclear tests unless he has an accurate knowledge of what radiation is, and of the somatic and genetic damage it can cause?

We have, therefore, a problem which is basically one of education. As Jesuit educators we may ask ourselves: What can Jesuit education contribute to the solution of this problem? Can Jesuit education turn out the broadly-trained scientists the world so badly needs, and at the same time convey to the non-scientists we educate some feeling for the facts and fancies of science? To attempt to answer this question we must consider some basic characteristics of Jesuit education, and the place mathematics and the natural sciences play in such an educational system.

There are many labels by which we might characterize Jesuit education, but let us, for our purpose, choose four which would seem to distinguish Jesuit education from other educational systems. Jesuit education is humanistic; it is Christian; it is adaptable; it aims at educating leaders.[3] Let us consider each of these in turn.

1. *Jesuit Education Is Humanistic*

We all feel we know what we mean by this. We mean that Jesuit education is liberal education in the full sense of the word. We mean that we are trying, as the phrase goes, *to educate the whole man.* We mean that we are striving to educate our students for a full life in this world, and not merely for some narrow specialty. To make this more precise let us adopt as one goal of Jesuit education the definition of humanism given by Jacques Maritain in his book *True Humanism*:

> . . . humanism . . . essentially tends to render man more truly human and to make his original greatness manifest by causing him to participate in all that can enrich him in nature and in

> history. . . . It at once demands that man make use of all the potentialities he holds within him, his creative powers and the life of the reason, and labour to make the powers of the physical world the instruments of his freedom.[4]

We have deliberately chosen this definition because it avoids a too restrictive view of humanism which equates humanistic development to the study of literature and especially of Greco-Roman literature. Such a view traces back to the Renaissance, which exalted again the old classical ideal of a purely literary humanism for the aristocratic elite. During the past few centuries this concept of humanism has broadened due to the development of the vernacular literatures, history, and science, and the overthrow of aristocratic by democratic ideals of education. But, as Father Norris Clarke has so well pointed out:

> . . . in those educational circles which still profess to impart a humanistic training and especially, perhaps, among Catholics, who by instinct tend to be conservative and traditional, many deep traces of the old individualistic and exclusively literary conception still linger tenaciously on. Sometimes they are not consciously recognized; sometimes they are even taught as essential to maintain the ideal.[5]

It is because we do not wish to restrict our concept of humanism in this way that we have embraced Maritain's definition of humanism. To show that we are not unfairly prejudicing the issue without considering the ideals of *the Society* in this matter, we may refer to the conclusions which Father George Ganss reached after his study of St. Ignatius' writings on education:

> It is to be noted that Ignatius did not hold any view which equated liberal education with training confined chiefly to humane letters in Latin and Greek. Such a shortsighted notion can be obtained from his writings only by removing from his educational plan that which he regarded as most important, the theology.[6]

2. *Jesuit Education Is Christian Education.*

This is, of course, merely to propound the obvious. The whole purpose of all our work as Jesuits is *ad majorem Dei gloriam*. Our educational ideal is not a natural, earth-bound humanism, but a Christian humanism which looks at all truth under the illumination of Christian revelation, and finds man's greatest model and inspiration in the person of Christ, our Lord. This is, of course, abundantly clear from the *Constitutions of the Society*. Thus in Part IV of the *Constitutions*, which is the fundamental source for all St. Ignatius' ideas on education, we read:

> The end of the learning acquired in this Society is, with the help of God, to aid the souls of its own members and those of their

> neighbors. This, therefore, is the criterion to be used in deciding, both in general and in the case of particular persons, what subjects members of the Society ought to learn, and how far they ought to progress in them.[7]

Though here Ignatius is talking about the studies of Ours, it is clear that he would apply an identical criterion in deciding what subjects our students should study. Thus, though he fully appreciated the humanistic values of the Latin and Greek classics, he did not consider them the be-all and end-all of Jesuit education. His mature thought on this subject we find in a letter which he wrote on March 30, 1955 (only 16 months before his death), to a scholastic who was teaching Latin and Greek at Loretto in Northern Italy. Ignatius writes:

> I should like you to inform me about the progress which your students are making in Latin and Greek letters; . . . For, as you know, in our times they are highly necessary to produce fruit in souls, especially in those northern regions—although for ourselves the theology itself would be enough without so much of Cicero and Demosthenes. But just as St. Paul became all things to all men that he might save them, so our Society, too, in its desire to aid souls takes up these spoils of Egypt to turn their use to the honor and glory of God.[8]

This leads us to the third important characteristic of Jesuit education.

3. *Jesuit Education Is Adaptable.*

In Father Ganss' recent book, *St. Ignatius' Idea of a Jesuit University*, this is the characteristic he stresses above all others. Ignatius was an eminently practical man, and he makes clear that his reason for choosing the subjects which he included in his curricula was their usefulness for living in his epoch. As a matter of fact "much of Ignatius' greatness arose from his keen awareness of the new needs and interests of his day."[9]

The *Magna Carta* of Jesuit education is the fourth part of the *Constitutions*. Here Ignatius refers to the *Ratio Studiorum* which had yet to be written and which would merely apply the principles set down in the Constitutions to concrete situations. He says:

> These present constitutions refer their readers to it (i.e., the *Ratio*), with the remark that *it ought to be adapted to places, times and persons.*[10]

This same phrase recurs again and again in this fourth part of the *Constitutions*. For example, in chapter 5 we read:

> Furthermore, account is to be taken of circumstances of time, place, persons, and other such factors, according to what seems best in our Lord to him who holds the chief responsibility.[11]

As Father Ganss has pointed out, the *Ratio Studiorum* is not our chief guide to St. Ignatius' ideas on education. The *Constitutions* are, and the thing stressed in the Constitutions is *adaptability*. Father Ganss' summary of his conclusions from a study of St. Ignatius' writings on education, though long, is well worth repeating here:

> Ignatius laid great stress on the necessity of adapting educational procedures to the varying circumstances of times, places and persons. For he considered procedures to be but means to perennial ends. In his educational scheme, there are timeless elements, such as the preeminence of theology, valuable to all generations, and there are timely elements which were especially suitable and valuable to the people of his own day, such as concern for Ciceronian literary graces in writing Latin. This timeliness is among the chief reasons why his education was so popular and consequently so successful in its day, and is certainly part of the spirit of his *Constitutions* on education. Also, because of his repeated insistence on adaptation to varying circumstances, the educational scheme which he bequeathed to his order is a flexible one which can be easily adapted to the varying interests and needs of different regions and successive eras. One of the clearest and strongest of his many pronouncements on this subject is the passage which gave rise to the successive drafts of a *Ratio Studiorum*.
>
> On the other hand, nostalgic yearning for an educational plan which was suitable to eras of the past, or a forlorn hope of bringing back its features which had ceased to be timely was not a part of his spirit. No evidence in his writings indicates that it was.[12]

It seems that St. Ignatius' stress on the adaptability and timeliness of Jesuit education needs reassertion today. How timely, and adapted to the scientific age in which we live is present-day Jesuit education? In this connection we might heed the warning of Whitehead:

> Any serious fundamental change in the intellectual outlook of human society must necessarily be followed by an educational revolution. It may be delayed for a generation by vested interests or by the passionate attachment of some leaders of thought to the cycle of ideas within which they received their own mental stimulus at an impressionable age. But the law is inexorable that education to be living and effective must be directed to informing pupils with those ideas, and to creating for them those capacities which will enable them to appreciate the current thought of their epoch.
>
> There is no such thing as a successful system of education in a vacuum, that is to say, a system which is divorced from immediate contact with the existing intellectual atmosphere. Education which is not modern shares the fate of all organic things which are kept too long.[13]

Because of Ignatius' stress on adaptability and timeliness, it seems unquestionable that Ignatius would not want the Jesuit education of the sixteenth, or even the nineteenth, century to be the education of today. The key elements would remain, but they would be adapted to the times in which we live. What form this adaptation would take is of course debatable, since we no longer have Ignatius' genius to guide us. But at least we should try to approach the problem with the same flexibility and courage that Ignatius would have brought to it.

4. *Jesuit Education Is an Education of Leaders.*

This is stressed by Ignatius throughout the *Constitutions*. Thus in the seventh part we find the general principle:

> This spiritual help which is conferred upon great and public persons . . . ought to be deemed of greater importance, for the same reason of its being a more universal good.[14]

This idea that we are to train leaders has become a commonplace among us. The present *Instructio* on our colleges says that we are to prepare *men of true eminence*. Our present General stressed it in his 1947 letter on the ministries of the Society:

> For the objective of our colleges is to form Catholic men who by example and influence can be guides to others in any art or any office. . . . I am afraid that sometimes the importance of the influence which Catholic men ought to have upon public life is all too little in the minds of *Ours*.[15]

Hence, all other things being equal, students should be encouraged to enter those fields where their qualities of leadership will do most good for the country and for God's cause on earth.

These, then, are the qualities we must look for in Jesuit education as conceived by St. Ignatius; it must be a Christian humanism which aims at training leaders and which is adaptable to the needs of the times. As regards the last two characteristics they certainly seem to demand a greater stress on mathematics and the sciences than exists in Jesuit education at present, both at the high school and the college levels. We are living in an age of science—that is indisputable. To be adapted to the times an alert educational system must impart some knowledge of the great force which is science to all its students. In addition the boys being educated for leadership today are the men who will make tomorrow's decisions. As we have said, these decisions cannot be made without a true understanding of science, and the men

who will be put in the influential positions to make these decisions will be men with adequate backgrounds in science. The world will therefore be deprived of the voices of many outstanding Catholic men in high places if we fail to give them the best possible education for the nuclear and space age in which they live. Also, as is well known, there is a great lack of competent Catholic scientists and mathematicians today. Hence the need of doing all we possibly can as Jesuit educators to encourage and train some of the scientific specialists the world and the Church both need so badly.

From these points of view we can muster a strong argument for increased stress on mathematics and the natural sciences in Jesuit education. But what of the first two requirements, that Jesuit education be a humanistic, Christian, education? If mathematics and the natural sciences are part of a true Christian humanism, then they certainly deserve a larger role in present-day Jesuit education. If they are not, then despite the demands of the times, they cannot be given such a role without perverting the very idea of Jesuit education. For only if mathematics and the sciences are worthwhile disciplines *in themselves*, deserving of a place in any truly liberal education, can they be considered worthy of increased emphasis in twentieth-century Jesuit education.

First, then, are mathematics and the natural sciences humanistic disciplines, or, at least, can they be such if properly taught? This is a question which has caused much fur to fly over the years, and much depends on the definition of humanism one chooses. If one embraces Maritain's definition of humanism given at the beginning of this paper, there is no doubt that the sciences are humanistic. The sciences certainly help man "to participate in all that can enrich him in nature"; they demand to a greater extent than most other disciplines "that man make use of all the potentialities he holds within him, his creative powers and the life of the reason"; and in a special way they enable man "to make the powers of the physical world the instruments of his freedom." Even if a narrower definition of humanism is chosen, it has to be admitted that science is one of *man's* greatest achievements, and that in knowing science one comes to know man better. As Gavin de Beer has said:

> If the humanities are the study of the thoughts and deeds of man, and science is one of man's greatest achievements, it may be asked why science has become excluded from the humanities.[16]

Only if one adopts a purely literary concept of humanism does science fail to qualify as a humanistic discipline. Such a restrictive concept of humanism is, however, decidedly old-fashioned today, and merely argues a narrowness of view that is the antithesis of true hu-

manism. A true humanist is contemporary; he lives in the present, and knows the men and the things of the present. A man who does not appreciate the place of mathematics and science in today's world simply does not know the world in which he lives, and hence is far removed from the ideal of humanism. Though we must admit that, in general, the humanizing values of literature surpass those of scientific study, there can certainly be no humanism worthy of the name without mathematics and the natural sciences.[17] This is appreciated by outstanding present-day thinkers, no matter what their fields of learning.

First let us hear from a few historians. Christopher Dawson defines science in very humanistic terms:

> Science is nothing else but the spiritual power of intelligence illuminating and ordering the multiplicity and confusion of the world of sense.

And George Sarton makes this more explicit:

> It is true that most men of letters and, I am sorry to add, not a few scientists, know science only by its material achievements, but ignore its spirit and see neither its internal beauty nor the beauty it extracts from the bosom of nature. . . . A true humanist must know the life of science as he knows the life of art and the the life of religion.[18]

Among educators similar ideas are prevalent. Robert Hutchins, the former president of the University of Chicago, says:

> . . . the rise of science is the most important fact of modern life. No student should be permitted to complete his education without understanding it.[19]

Jacques Barzun, literateur and educator, insists:

> Fortunately there is no doubt whatever about the place of the sciences: they *are* humanities and they belong in the college curriculum.[20]

Finally let us consider what a number of outstanding scientists have to say on this point. Professor Frederick Seitz of the University of Illinois says:

> The great generalizations of science are primarily of humanistic value. They occupy positions along with the great generalizations of other fields, such as art, history, literature, philosophy and religion.[21]

Dr. Merle Tuve, Director of the Carnegie Institute in Washington, adds:

> I believe that science must firmly be included among the liberal-

> izing humanities in any honest assessment of modern thought and knowledge.[22]

And Professor L. A. DuBridge of the California Institute of Technology has this to say:

> Again we hear the cry: 'Do not forget the liberal arts.' To that, of course, there is a simple reply: Science is one of the essential liberal arts. It ranks along with literature, art, music, as one of the finest and most elevating achievements of the mind of man. A liberal arts education does not deserve the name if it includes no science.[23]

One of the finest statements I have found on this point is that of a fellow Jesuit scientist and educator, Father A. H. Poetker, S.J., one-time President of the University of Detroit. According to Father Poetker:

> The sciences have a very definite cultural value and provide an area of knowledge, without competence in which there can be no liberal education. The principles of science are the principles of truth, whose study is ennobling because it attempts to solve the mystery of the universe. There can be no doubt that the natural sciences afford material which is as suitable as languages or the social sciences for the development of those capacities of human personality that are the formal object of our education—logical reasoning, discrimination, philosophical generalization, rigorous mental discipline, accuracy, intellectual honesty, even imagination and the esthetic sense.[24]

I hope that these quotations have not been too tedious. They represent, I believe, a fair sampling of the views of most sincere scientists and humanists who have given thought to this problem. They realize that science is necessarily part of a humanistic education, and that one of the big problems of the day is to work out the practical details of a liberal education that is truly contemporary. Thus the problems of Jesuit education are part and parcel of the problems of American education in general.

Does this picture change if we specify that the humanism we desire is a Christian humanism which transcends this world and the potentialities of unaided human nature? Is there still a place for science in the *Christian* humanism that is the aim of Jesuit education? This is really to ask if science has any importance in the Christian scheme of things. The answer, as we shall try to show, is an unqualified *yes*.

First of all, science is something good in itself, for, as Kepler has said, in discovering the ways of nature the scientist is *thinking God's thoughts after him*. The scientist is engaged in learning more about

the secrets of the universe, and according to Gilson, this *is one of the highest praises of God; the understanding of what God has made.*[25] The truth accessible to science is a part, small though it may be, of the totality of God's truth, and it is man's task to discover as much of this truth as possible. As the present Holy Father* recently put it:

> The Lord who has put into the heart of man an insatiable desire to know did not intend to set a limit to is efforts to conquer when He said, *Subdue the earth.* It is the whole creation that He has entrusted to him and that He offers to the human mind so that he may ponder it and thus be able to understand more deeply the infinite goodness of His Creator.[26]

Now this ideal is attained more completely by research scientists ferreting out new facts and developing new theories, but it is also reached to a lesser extent by students seeing the amazing world about them open up in all its beauty under the instruction of an inspiring scientific teacher. They too learn to know God better, and therefore to love Him more, by learning more of the universe in which they live.

This would be true even if God had never become man. But in a religion that is founded on the historical fact of the Incarnation, science has a far greater importance. Since in the Incarnation God did not hestitate to take an earthly body to Himself, atoms, molecules and human cells must become objects of great significance and curiosity to the Christian, for these constituents of the human body were held in hypostatic union with the Divinity for the thirty-three years of Our Lord's life on earth, and are still united to the Divinity in heaven. Matter is no longer evil or indifferent; it is good, and it has a role to play in the drama of salvation. The duty of the Christian is to spiritualize it and bring it to the peak of perfection God wants it to have when He comes again at the end of the world. The scientist is cooperating in this great plan of God for the universe, and the student studying science is seeing this plan unfold before him.

In a true sense the scientist is aiding the Church in her mission of imparting God's revelation to the world. A number of Catholic thinkers have recently stressed the idea that there are two forms of revelation, a natural revelation and a supernatural revelation.[27] In uncovering the secrets of nature the scientist is cooperating in a form of natural revelation, which gives insights into God's universe which could not be gotten from any other source. Though these secrets are slight compared to the great facts of supernatural revelation given to us by the Church, they are not insignificant. Lance Wright has spoken of "the mistake of refusing to allow that the facts which man has apparently stumbled on by himself are as much *of God* as those which

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* Pope Pius XII, † October 1958. *Ed.*

his church has mediated."[28] These insights of the scientist cannot be neglected by the Church without distorting God's truth, which is *one*.

There are many other things we might say about the basically Christian nature of science: the fact that science tends to develop natural virtues which are basically Christian—humility, patience, perserverance, honesty, integrity; the fact that science's presuppositions are founded on the medieval, Christian belief in the rationality of the universe, as Whitehead has pointed out; the fact that science's insistence that nature's secrets can only be uncovered by appeal to observation and experiment is ultimately traceable to the Christian doctrine of creation and God's freedom in creating one out of many possible universes.

If this is true, then, if science has a place among the humanities and promotes distinctly Christian values, there is no doubt that in this age when scientists and Catholic leaders with a knowledge of science are in such demand, there is need for an adaptable Jesuit education to adapt itself more to the times. The nature of this adaptation remains to be worked out, but it should include increased emphasis on the natural sciences for all students at both the high school and the college level. We need specialists in science who get intensive courses in their major fields in science in college, but we also need non-scientists who through their science and mathematics courses in high school and college are made to realize the true nature of the world in which they live.

Most of us feel that if our students are to compete with the boys from non-Jesuit schools in scholarship and fellowship competitions there is need of additional mathematics and science in the curriculum. But when we try to persuade Deans of the need for additional courses we are met with the objection that we are giving a Jesuit, liberal education, and there is no room for additional technical courses. We have to convince Administrators (and perhaps ourselves) of the humanistic value of the science courses we teach, and argue that they are necessary for this reason, and not merely for pre-professional training. As regards our science majors in college, we might remind ourselves of Whitehead's demand that a liberal education produce *style* in the student, where by *style* he means that the student knows some one field well and that he should be able to do some one thing well. *Style* is therefore "the peculiar contribution of specialism to culture"[29] and without it there is danger that we will turn out men who know a little about a lot of things, but have not mastered any one subject sufficiently to become the leaders we need today. There is a real need, therefore, for specialization, but specialization does not mean that a man knows one field only. What we should aim at is a graduate who is liberally, humanistically trained but still has a mastery of one par-

ticular field, be it scientific or non-scientific, in which he gives promise of becoming a Christian leader of the type Ignatius envisioned.

How this will be accomplished, how equal justice can be done to the demands of a broad, liberal education, and simultaneously to those of an intense specialization in one field, whether scientific or not, is a very difficult practical problem, which may never be perfectly settled. We must learn to live with it, and do the best we can according to our lights.

In conclusion let me quote a passage from Father Walter Ong, S.J., which I think summarizes much of what we have been trying to say and points up the difficulty of the questions still to be answered:

> There is no doubt that in our own age a new humanism is needed, and one which has an entirely new orientation toward history from that of the Renaissance. There are huge issues to be faced, among the most notable that of communications in the mass society in which we are born and live, and that of the role of the machine and associated phenomena which must be integrated in our civilization into any humanism we propose to live. There is, of course, no neat and clear-cut set of answers available to us in handling these issues, because they are not clear, abstract problems which can be fitted with neat answers, but concrete issues which simply have to be lived with. In facing them, one thing is certain: although we can and must learn from the past, we cannot turn back, and we should not even dream of turning back. To this extent, Renaissance humanism is clearly *passé*.[30] Christianity, a world view which, unlike other religions, bases its teachings on a real sacred history, has overcome the Renaissance and, by our day, imparted its outlook to the whole of mankind, so that now even non-Christian and anti-Christian cultures live in a linear rather than a circular time, in an attitude of expectation, faced toward the future, when as we know, Christ will come again.
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> If this is true of the world at large, it is doubly true of America. And if it is true of America, it should be doubly true of Catholics here. We are the people of the future in the land of the future. To be sure, our heritage stretches far back into the past. It is Renaissance and medieval and much more. But there is no solution for our dilemmas there. The dialectic of medieval and Renaissance only points up the dialectic of specialized, scientific training and of nonspecialized, liberal education which must be faced in every age, and more urgently than ever in our own. It would be a mistake if we failed to see these issues squarely. There is some danger, I believe, that Catholic intellectuals—or those who should be Catholic intellectuals—may be tempted to take refuge not in history but simply in the past.[31]

This is a danger that Jesuit education must constantly guard

against if it is to be the alert, timely, adaptable educational system St. Ignatius wanted it to be.

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8. *MHSJ, Monumenta Ignatiana*, ser. 1, *Epist.*, tom. 8, pp. 91, 618; quoted in Ganss, *op. cit.*, p. 157.
9. Ganss, *op. cit.*, p. 193.
10. *Constitutiones*, Part IV, c. 13, n. 2A (italics added).
11. *Constitutiones*, Part IV, c. 5, n. 1; cf. also IV, c. 13, n. 3e; IV, c. 12, n. 2.
12. Ganss, *op. cit.*, pp. 189-190.
13. Alfred N. Whitehead, *The Aims of Education.* New York: Mentor Books, **1929**, p. 83.
14. *Constitutiones*, Part VII, c. 2, n. 1D.
15. *Acta Romana Societis Jesu*, 11, 320 (1947). See also Paul C. Reinert, S.J., "The Intellectual Apostolate", *Jesuit Educational Quarterly*, **13**, 69 (1950).
16. Gavin de Beer, *Science and the Humanities.* London: H. K. Lewis & Co., **1956**, p. 11.
17. There is an apparent lack of appreciation of this fact in the report given by the Commission on Liberal Arts Colleges at the annual meeting of the Jesuit Educational Association held at St. Louis, April 2, 1956. *Jesuit Educational Quarterly*, 19 [1956-57], pp. 83-86). The Committee talks about " . . . the mature development of the student through a carefully integrated curriculum". They then go on to detail the things which contribute to this—language, public speaking, literature, history, social science, philosophy and theology. *But there is not even a mention of mathematics or the natural sciences.* Is this a Christian Humanism for today? A far more perceptive, and realistic, discussion is that of Father Robert Henle in his article, "Ob-

jectives of Catholic and Jesuit Liberal Arts Education: A Symposium," *Jesuit Educational Quarterly*, 19 (1956-57), pp. 87-93. Father Henle stresses that a good curriculum must "relate the student through knowledge to his present environment, *to the cuture in which he lives*". He also quotes a statement of Father Klubertanz to the effect that "A man cannot deal with the world or modern culture without a knowledge of the general factual framework of science and some understanding of the nature of science" (p. 92).

18. George Sarton, *The Life of Science*. New York: Henry Schuman, **1948**, quotation on p. VI.

19. Robert M. Hutchins, *Education for Freedom*. Baton Rouge, La.: Louisiana State University Press, **1943**, p. 34.

20. Jacques Barzun, *Teacher in America*. Boston: Little, Brown & Co. **1945**, p. 91.

21. Frederick Seitz, "Education for Science and Engineering", *Physics Today*, 11, No. 7 (July, 1958), p. 12.

22. Merle Tuve, New York Times, March 24, 1958, p. 19.

23. L. A. DuBridge, statement before U. S. Senate Committee on Labor and Public Welfare; quoted in *American Institute of Physics Newsletter*, 1, No. 10 (August 20, 1958).

24. A. H. Poetker, S.J., quoted in *Jesuit Educational Quarterly*, 11 (1949), p. 236.

25. E. Gilson, *Christianity and Philosophy*. New York: Sheed and Ward, **1939**, p. 113.

26. Pope Pinus XII, Address to Seventh International Congress of Astronautics, Sept. 20, 1956 (*The Pope Speaks*, 3 [1956], pp. 305-8). Cf. also the address of Pope Pius XII to Pontifical Academy of Science, April 24, 1955.

27. Cf., e.g., Friedrich Dessauer, *Begegnung zwischen Naturwissenschaft und Theologie*. Frankfurt am Main: Verlag Josef Knecht Carolusdruckerei, **1952**.

28. Lance Wright, "The Apostolic Role of the University Graduate," *Downside Review*, 70 (1952-3), p. 51.

29. Whitehead, *op. cit.*, p. 25.

30. By Renaissance humanism Father Ong means the old classical ideal of a purely literary humanism for the aristocratic elite, as was mentioned above.

31. Walter Ong, S.J., "Renaissance Ideas and the American Catholic Mind," *Thought*, 29 (1954), p. 355.

Abstracts

Recent Advances in Sydnone Chemistry, by Charles J. Thoman. Abstract. The unsuccessful efforts made at Woodstock during the past year to prepare N-(2-imidazolyl) glycine ethyl ester hydrochloride as the first step toward the synthesis of the corresponding sydnone were described. The attempted condensation of glycolaldehyde diacetal, prepared from chloroacetaldehyde diacetal, with guanidoacetic acid resulted only in the recovery of the acid in the form of its hydrochloride salt. It was proven, however, that the melting point for this compound given in the literature (200° C.) was in error, the correct value being 177-8°.

An explanation was then given of the proposed series of reactions leading to sulfasydnone:

$$H_2N\text{-}NH\text{-}CH_2COOCH_3 \cdot HCl + NaNO_2 \longrightarrow$$

$$H_2N\text{-}N(NO)\text{-}CH_2COOCH_3 +$$

$$p\text{-}CH_3CONH\text{-}C_6H_4\text{-}SO_2Cl \xrightarrow[\text{(pyridine)}]{}$$

$$p\text{-}CH_3CONH\text{-}C_6H_4\text{-}SO_2NH\text{-}N(NO)\text{-}CH_2COOCH_3$$

$$\xrightarrow[1)\ NaOH,\ 2)\ Ac_2O,\ 3)\ HCl]{}$$

$$p\text{-}H_2N\text{-}C_6H_4\text{-}SO_2NH\text{-}N\text{-}CH\text{-}C=O$$

$$\qquad\qquad\qquad\qquad\qquad\qquad\quad N \overset{\pm}{-} O$$

During the past summer, the first two steps were apparently successfully completed. Methyl hydrazinoacetate hydrochloride was reacted with aqueous sodium nitrite to yield an orange-red oil, whose boiling point is now being determined at Fordham University. This oil was condensed with acetaminobenzenesulfonyl chloride in pyridine, giving white needles, melting at 237-8 degrees. Both compounds are now being analyzed. Attempts to attain the sydnone itself will be made in the near future.

Several new sydnones have been synthesized at Fordham University during the past year, including the 3-quinolylsydnone, 3-(5-bromopyridyl) sydnone, 3-pyridylsydnone-1-oxide, and 3-(5-bromopyridyl) syndnone-1-oxide; none, however, has shown the phototropic characteristic of 3-pyridylsydnone.

Recent physical studies on the phototropic 3-pyridylsydnone by means of nuclear spin resonance indicates, most unexpectedly, that the color change and the paramagnetism hitherto connected with it are in reality quite independent; when the color change is induced in a vacuum, the paramagnetism does not appear until the introduction of oxygen, usually atmospheric. Such a dependence of the paramagnetism on oxygen seems to be unique, and is not found in other phototropic substances.

Gravimetric Experiments for Freshman Chemists, by Rev. B. A. Fiekers, S.J. Abstract. A survey of current laboratory manuals on the topic of gravimetric experiments for use in Freshman chemistry was made and copy was distributed at the meeting. Author then took up the possibility of using graphical methods in connection with binary compounds for the purpose of correlating data on their composition under a variety of analytic units as well as formula derivation. The chemist's objective is the *integral* subscript in the formula. Percentage composition and other analytic and primary laboratory data, generally non-integral, though necessary, are ancilliary and often confusing to the student.

Pioneers, Opportunists or Scientists? III. Harvey, by Rev. Anthony J. MacCormack. Abstract. The unexplained facet of Harvey's life is his deliberate attack on a doctrine held firmly by all though he was a most conservative individual, hard-headed and practical in treating his many patients. Perhaps, the explanation may lie in the influence of Fabricius who always regarded Harvey as his favorite pupil.

Harvey's wide-ranging experimental work demonstrated, *quantitatively*, the circulation of the blood from the heart to the heart. His decisive data ended Galen's *ebb and flow* explanation of two independent fluids, the venous or *natural blood* and the *arterial* or *vitalized blood*. Yet so strong was the ancient belief his only reward, in his day, was opposition and derision.

Harvey first announced his circulation in his second lecture, April 17, 1616. Later, in 1628 he published a 72-page work, *Exercitatio Anatomica de Motu Cordis et Sanguinis*. The final form came in his *Exercitationes Duae Anatomicae . . . ad Johannen Riolan* in 1649.

The unfortunate aspect of his work for those who so strenuously hail him as a prophet of the *New Science* is Harvey's most sincere belief in Aristotle as his leader.

The Statistics Program of the Commission of Mathematics, by John W. Green. Abstract. The new course in probability and statistics for high school seniors was developed and some of the topics such as sample spaces, binomial distribution, binomial tables and random numbers were illustrated.

The Semantic Tableau, by Rev. C. Frederick Koehler. Abstract. One of the problems of logic is to discover a straightforward derivation of a conlusion V from a series of premises $U_1, U_2, \ldots U_n$. A systematic process called the Semantic Tableau was recently discovered by Professor E. W. Beth of the University of Amsterdam. If the conclusion V does not follow from the premises, the tableau will provide a counter example.

The rules for the construction of the Tableau were discussed and the following propositions analyzed:

$$(\overline{A} \rightarrow B) \qquad \rightarrow (B \vee A)$$

$$(A \rightarrow B) \qquad \rightarrow (B \rightarrow A)$$

$$(x)\ [\overline{A(x)} \vee B] \rightarrow \{E(y)A(y) \rightarrow B\}$$

$$(x)\ [P(x) \qquad \rightarrow \overline{M(x)}\ ] \,\&\, E(y)\ [M(y) \,\&\, S(y)\ ] \rightarrow$$

$$E(z)[S(z) \ \&\ \overline{P(z)}\ ]$$

The tree of each logical deduction was developed and a brief outline of the application of the Tableau to Intuitionistic Logic, Model Logic, and Set Theory was noted.

The Advanced Laboratory in Physics at Boston College, by Rev. William G. Guindon, S.J. Abstract. Advanced laboratory work should stimulate initiative and originality, and increase research scientists among our alumni.

Upper-division laboratory can range from set experiments through project-type work to small research projects. The additional time, expense, personnel and space needed to provide the stimulus of individual project are outweighed by the development of the student, and the occasional assistance to faculty research work. Beginnings have been made at Boston College in the framework of developing curricula; both individual research assignments and laboratory work designed to evoke original thinking have been tried and are being continued.

A constant effort must be made to make the laboratory help in teaching what the physicist is and does. The demands of planning, space, time and personnel should not be allowed to overshadow the benefits of original laboratory experience, particularly for the gifted student.

News Items*

Boston College. Biology Department's Dr. Bernard Sullivan was awarded an Air Force (Aero-Medical Division) grant to study peripheral vascular responses to cold injury. He has recently published *Influence of Inositol on Peripheral Vascular Responses to Cold Injury* in *Proc. Soc. Exp. Biol. & Med.* and similar articles in *Am. J. Physiol.*

Dr. Walter J. Fimian received a renewal of a grant from the American Cancer Society (Mass. Div.) for radioautographic and radioassay analyses of malignant melanomas.

Boston College lands Edward DeGraw, a junior and chemistry major, on the Chemists' and Chemical Engineers' Honor Roll of Students, who participate actively in football and still major in chemistry, according to *Chemical and Engineering News* for Dec. 2, 1957. The roster, which credits Boston University with DeGraw while correctly designating Boston College with his photograph, includes one other student of *ours*, Daniel Bender of Xavier University among the seventy-five or so on the list. Fr. Albert McGuinn of Boston College contributes to the text of this article a very reasonable ideal for the athlete and student.

The National Cystic Fibrosis Foundation has awarded Prof. Truman Licht, of the Chemistry Department, a grant for the investigation of the chemical composition of sweat.

Boston College. The Mathematics Department will utilize a N.S.F. grant of $10,000 for an in-service institute for fifty high school mathematics teachers. They will be trained in a course of modern mathematics and statistics suitable for high school classes. A similar program is planned for elementary schools, the first step for this was taken with the grant of $25,000 awarded by the Ford Foundation in order to develop a curriculum.

Fr. Stanley J. Bezuszka has put out an experimental text for high school algebra entitled: *Sets, Operations and Patterns.* This summer a demonstration class of forty-eight eighth grade students was conducted in modern high school algebra. The in-service program for teachers will be expanded and it is hoped that many more teachers will participate.

* Rev. Bernard M. Scully, S.J., Cranwell Preparatory School, Lenox, Mass., has kindly taken up duty as News Editor. Kindly send news items to him.—Ed.

Dr. Rene Marcou is working on Ionospheric Research under Air Force contract.

Fifteen undergraduate degrees in mathematics and two graduate ones were awarded by Boston College in June 1958. There are approximately 215 B.S. Mathematics *majors* enrolled for 1958-9.

The Physics Department is conducting in-service courses on Physics for high-school teachers. This is in conjunction with the Physical Science Study Committee headed by Dr. Zachariah of M.I.T.

Canisius College. The Chemistry Department recently obtained a Fisher-Gulf Partioner for graduate work and consulting. The second infra-red spectroscopy institute was held August 26-30. Speakers included Dr. Leonard Woodward of Oxford, Brother Columba Curran of Notre Dame and Dr. VanZandt Williams of Perkins-Elmer. A Radiological Safety Conference is planned for June, 1959.

Dr. Herman Szymanski has received a fourth-year renewal of his A.E.C. grant for studying radiation damaged materials.

In Chemistry there are 30 Juniors and Seniors. There are 53 Graduate Students, 12 of whom will graduate this year.

Fairfield Preparatory School. Fr. Francis Dutram won a National Science Foundation award to study Modern Physics at the University of Connecticut during the summer. Fr. John McGrath, S.J., also won a N.S.F. award to study Projective Geometry and Electronics during the summer at Michigan State. Fr. John Green, S.J., won a N.S.F. grant to study Probability and Statistics and Theory of Numbers at University of Wisconsin in the summer. He is now teaching calculus to a class of 30 seniors to prepare them for the Advanced Placement Exam in May.

Fordham University. The Department of Biology has received a grant of $5000 from the Esso Foundation for the construction of a greenhouse atop the Biology Building. Dr. Ludwig has received a $30,000 grant from the National Institutes of Health. Fr. Charles Berger's N.S.F. grant of $9,000 is now in the last of its three years. Ten graduate students attended biological courses at summer laboratory institutes.

Eighty-three graduate students are enrolled in Biology. Eight Jesuits from foreign countries are enrolled in graduate Biology courses.

For the school year 1958-9 a total of $108,775 in grants was made for chemical research. The largest of these is a $16,000 grant from the U.S. Public Health Service to Dr. Hennessy.

In Chemistry, nine Ph.D. degrees were awarded and eleven Master's degrees. There are ninety Chemistry undergraduate Chemistry majors and ninety graduate degree candidates.

The Mathematics Department was awarded $47,050 from the N.S.F. for last summer's Institute for High School Teachers of Mathematics. Sixty-three participants were given grants. Courses in Modern Geometry and in Statistics were offered. The Mathematics Department also received $4,350 from the N.S.F. for an in-service course during the school year 1958-9.

Fr. Joseph Mulligan, of the Physics Department, has received a grant of $14,000 for two years from the National Science Foundation in support of research on *Electron Correlation in Atoms and Molecules.* He has collaborated with Edward Burke in publishing *Open-Shell Energies of Lithium-Like Ions* in *J. of Chem. Physics,* May, 1958.

The Physics Department ran a Summer Institute for High School Physics teachers, sponsored by the New York State Department of Education. Prof. Mark Zemansky of C.C.N.Y. was a seminar speaker.

Fr. Frederick Canavan spent the summer as a Research Associate at the Radiation Laboratory of the University of California.

Dr. Alfons Weber has received a grant of $4,000 from the Research Corporation in support of his work on *The High-Resolution Spectra of the Boron Halides and Hydrides.*

Dr. Victor Hess, Nobel Laureate in Physics in 1936 was awarded honorary degrees by the University of Innsbruck and the University of Graz. Dr. Hess has directed Henry Miranda on work in radiation which has appeared in several journals.

Fr. Walter Miller has been awarded a second grant by the N.S.F. for his research program on Faint Variable Stars in the Milky Way.

School of Pharmacy's Dr. Louis N. Elowe has been appointed associate professor of pharmacy. Dr. Elowe was formerly a member of the University of Toronto staff. Mr. Ira Sharenow has been appointed lecturer of professional law. Mr. Friedrich Wallenberger has been appointed instructor of chemistry. Mr. Joseph McSweeney has been appointed instructor of biology. Mr. Paul Buday joins the faculty as assistant professor of biological sciences February 1, 1958. Mr. Buday is a candidate for the Ph.D. degree in pharmacology at Purdue University. *American Journal of Pharmaceutical Education, 21,* 455 (1957).

Georgetown University. The Chemistry Department has just installed a new Inorganic Chemical laboratory. The Graduate Chemistry Department has ninety degree candidates. In the undergraduate department are thirty B.S. Chemistry candidates.

Dr. Robert Hartman has been appointed Chairman of the Chemistry Department, succeeding Fr. Joseph Duke, S.J., now at Wheeling College. Dr. William Zorbach, appointed as Associate Professor of Chemistry, will continue his research in synthetic organic chemistry. Dr. Soma Kumar has been appointed Assistant Professor of Chemistry. He has come from the All-India Institute of Medical Sciences in Delhi. He will teach Biochemistry and continue his research in that field. Dr. Joseph Earley, formerly of Brown and Chicago, will teach General Chemistry and Advanced Inorganic Chemistry.

Under the direction of Dr. Michael Sullivan, studies of toxemia of pregnancy are being conducted. Dr. Sullivan is also investigating the metabolic pathway of cancer compounds.

The Chemistry Department is compiling a list of its publications. It is believed that there are nearly four hundred.

The Department of Physics holds two grants from the N.S.F. for development of microwave research and shock wave research. Dr. Charles Beckel received a Fulbright grant to teach Physics at the University of Peshwar, Pakistan. The Physics Department was alloted $10,000 from the University for equipment of a new laboratory of experimental nuclear physics. The Department has six Senior Physics majors and twenty-four graduate students.

College of the Holy Cross. The Department of Chemistry resumed its Master of Science program in September 1958, after an interruption during the previous year due to the lack of suitably qualified candidates. An experimental institute on the teaching of chemistry was conducted by Father J. A. Martus during July, 1958. Early in August 1958, ground was broken for a new physical science building to house the departments of chemistry, mathematics and physics, along with a half a floor of common classroom space. Plans call for four floors (lecture amphitheaters covering two in part) for chemistry in the west wing, a fifth floor of classrooms in that wing and three floors for physics and mathematics (two and one respectively) in the east wing. Chemistry is separated from the other departments by a central section, containing a foyer, a two-floor library for the three sciences with capacity for 25,000 volumes, and classroom space on top. Half of the library area will contain a reading room (two floors high) and the other half will contain three tiers of stacks. There will be approximately 80,000 square feet to the building. Offices and the larger lecture hall, along with certain laboratories will be air-conditioned. Basic contract, exclusive of library stacks, laboratory and other furniture came to $1.157 million. Completion is expected in September 1959. The building is near the biology, thus

forming a natural science unit at the west end of the campus. Dr. VanHook spent the summer in the southern hemisphere, at the invitation of the Colonial and other sugar refineries in Australia.

In June 1958, College awarded honorary D.Sc. to Dr. Francis O. Rice, Head of the Chemistry Department at the Catholic University of America, and formerly of Johns Hopkins University. Dr. Rice has mentored many doctorates of the *nostri* since and including his days at Johns Hopkins. He is an alumnus of *our* St. Francis Xavier's in Liverpool. He has been very prominent in the chemical profession. His most recent achievement, to which some of *ours* contributed, is the stabilization of the free radical, $=NH$. He has been named consultant to the National Bureau of Standards which has received a $1 million grant for study of free radicals.

Fr. Fiekers attended the Spring meeting of the Am. Chem. Soc. in San Francisco, Cal., and the Fall meeting in Chicago. He is a member of the A.C.S. council, along with Fr. Arthur L. McNeil of Gonzaga University in Spokane. Father Fiekers is also a member of the Council Committee on Chemical Education and has become chairman of the Council Sub-committee on Teacher Affiliation with the Am. Chem. Soc. On the occasion of the west coast meeting he represented the New England Association of Chemistry Teachers at the meeting of their western counterpart, the Pacific Southwest Association of Chemistry Teachers. Dr. VanHook has become chairman-elect of the Cen. Mass. Sec., Am. Chem. Soc. and is in charge of programs this year. On Nov. 10, 1958, he is having President-elect of the Am. Chem. Soc., John C. Bailar, visit the campus and speak to the local section here on Co-ordination Polymerization. This meeting is to be preceded by dinner in Kimball Hall.

Fr. J. Gerard Mears, former head of the Holy Cross Fine Arts Department did us a favor recently in designing and carving a seal for our Cross & Crucible Chemists' Club. This seal is about twenty inches in diameter, giving in an outer circle the name of the club and its foundation date, and at its center the cross appears over a crucible and a pair of crossed retorts. The cross is inscribed *in hoc signo vinces* and at its foot there appears a scroll bearing the inscription *ubi crux, ibi lux*. By some fortunate coincidence we happened to buy a run of the *Journal of the Chemical Society* in the early 1920's, some of the volumes of which had been in the library of Sir William Crookes. It was from this bookplate that we got the inscription for the scroll.

According to the recent publication, *Doctorate Production in United States Universities*, 1935-1956, No. 582 NAS/NRC (Trytton Report), Washington, D. C., 1958, the Chemistry Department was fifth among Jesuit Schools, seventh among Catholic Schools and 141st among 704 American Colleges (and Universities) for its 23 alumni

doctorates over this time whose bachelor degree originated here. We estimate that 55-60 alumni hold chemistry or biochemistry doctorates, when we include those prior to 1935 and after 1956, certain exmen, and those from other institutions who received M.S. only, here.

Current grants in department include one to Dr. VanHook from the Sugar Research Foundation, and one for $2500 to Dr. Baril from the American Petroleum Institute. Departmental publications now number ninety.

On November 22, 1957, Dr. Lloyd F. Smith, ex-25 and staff '31-2, of Duarte, Cal., gave an illustrated lecture to the Jesuit community on Russia. In the autumn of 1956, Dr. Smith toured Russia on a grant from the Eli Lilly Pharmaceutical Co. and reported on medical topics in one of the Lilly trade journals. One year later he repeated this tour at the invitation of the Russian Academy of Medical Science. His son is a student at Holy Cross.

Loyola College. Fr. Edward S. Hauber has published the second edition of the Directory of Chemistry Alumni. A complete list is furnished naming alumni and their positions as well as a list of institutions which have conferred degrees on alumni. Twenty-three Ph.D. alumni are listed as well as twelve candidates for this degree.

McQuaid Jesuit High School, Rochester, N. Y. Under the direction of Mr. Roy Drake, S.J., the science club is building a seismograph. Plans are under way for building an apparatus to detect radio-active fall-out and also a cloud chamber for particle study. It is hoped that a radio telescope will be constructed by the club. A cyclotron is now being designed by the club. In March, McQuaid will be host to 100 schools for the Diocesan Science Fair.

St. Joseph's College, Philadelphia. A Chemical Research Laboratory for graduate students was opened this year. A constant temperature room and a room for radiochemistry research are included. The graduate school has 80 students. A Master's degree may be obtained in two years by attending classes two evening a week and on Saturday mornings. The Chemistry Department offered summer courses in general inorganic chemistry and in organic chemistry in 1958 for the first time. The graduate school will add biochemistry to its curriculum.

Professors George J. Beichl and Bernard L. Miller were awarded Science Faculty Fellowships by the National Science Foundation, ac-

cording to the Foundation's release of March 20, 1958. Prof. Beichl will work in chemistry at the Technische Hochschule of the University of Munich; Prof. Miller, in physics at the University of Pennsylvania.

St. Peter's College, Jersey City. The Chemistry Department won the approval of the Committee on Professional Training, A.C.S. About fifteen chemistry majors graduate each year.

A study of Chemistry Alumni shows that there are eighteen Ph.D. holders and thirty with Master's degrees. Twelve alumni are candidates for Ph.D. degrees.

After sparking the Chemistry Department for eight years, Dr. Charles McCauley began the study of medicine at Georgetown University. His place was taken by Stephen Leone, a Boston College alumnus.

A new laboratory accommodating 42 students will be used for histology, embryology, zoology and entomology.

Fr. Jerome Gruszczyk had a N.S.F. grant to attend a Summer Institute for College Biology Teachers at Oregon State College. Fr. Joseph Schuh had a grant from the Atomic Energy Commission for radiographic study of somatic changes in the mosquito.

Mr. Francis Varricio of the Mathematics Department attended a course at Southern Methodist University last summer. Remington Rand sponsored this special course in the Univac Computer 1103.

Of the eight mathematics *majors* who graduated in June, five won eighteen scholarships and fellowships for graduate study.

A Committee on Research has been formed as a result of the Jesuit Research Council of America.

Weston College Science Colloquium programs include: Geological Localities of Central North America, by Fr. James W. Skehan on Jan. 26, 1958; Radiations and the Biological System, by Walter J. Fimian, Jr., of Boston College, on Feb. 27, 1958; the Sixth Annual *Quigley-Abern* Lecture, on Project Vanguard, by Dr. John P. Hagen, on April 20, 1958; Recent Expeditions to the Antarctic, by Fr. Daniel Linehan, on Sept. 28, 1958; and Atoms for Peace, or Controlled Thermonuclear Fusion Today, by Prof. W. T. Allis, of Mass. Inst. Tech., on Nov. 2, 1958.

Weston Seismological Observatory. Two contracts were recently made with the U.S. Air Force to place buildings and equipment on the Weston College property. One contract is for terrestrial magnetic studies, the other for space tracking. For the magnetic studies, five non-magnetic buildings have been erected near the Ob-

servatory. Three technicians and additional student help have joined the Observatory personnel to take care of this program.

For space-tracking, the equipment is housed in a specially-built laboratory trailer. Special antennas will be placed around the property.

New equipment is being added to the Observatory to study terrestrial magnetism, telluric currents and ionization of the lower atmosphere. Eight graduate students will use this apparatus.

Fr. Linehan, S.J., has eleven more recent publications.

A recent advertisement for *Tracerlab* carries a picture of Fr. Linehan at the South Pole checking radio-activity with some of the company's equipment.

Fr. Daniel Linehan recently received the U.S. Navy's Distinguished Public Service Award, the highest award that the Navy confers on civilians.

Varia. Honorary degrees of scientific interest awarded by Jesuit scientific institutions in 1958 include: Boston College and Fordham University, a Doctor of Science to Harold Marston Morse, Mathematician of the Princeton Institute for Higher Studies; Canisius College, an LL.D. to Sir Hugh S. Taylor, Dean of the Graduate School of Princeton University—also Doctor of Science to Leston P. Faneuf, President of Bell Aircraft Corporation; College of the Holy Cross, Doctor of Science to Dr. Charles J. E. Kickham, H.C. '23 and to Dr. Francis O. Rice, Chemist, Catholic University of America; and St. Louis University, a Doctor of Science to Dr. Wernher von Braun, Technical Director of the Army Ballistic Missile Agency.

The magazine section of the *Cleveland Plain Dealer* for June 1, 1958 carries a color illustrated article by Fr. Birkenhauer, entitled *Antarctic Journal*. One picture shows the John Carroll University pennant decorating an Antarctic shelter and bears the caption: The University's farthest out-post. Fr. Birkenhauer keeps contact with the University from time to time via *ham radio*.

Prof. Stancil S. Cooper of the St. Louis University Chemistry faculty died this year. In his memory a set of suitably inscribed journals will be placed in the University's Chemical Library.

Fr. Pierre Lejay, Jesuit Geophysicist, Director at Zi-wa-wei for many years, passed away on or about Oct. 12, 1958, while returning to France from an IGY meeting in the United States. (*N.Y. Times*, Oct. 12, 1958.) R.I.P.

Fr. George J. Shiple passed away on May 18, 1958 at the University of Detroit. He had done his doctorate studies in biochemistry at Fordham as a scholastic and studied theology at Woodstock College. Thus his membership in this ASSOCIATION is dated from its very beginning. May his soul rest in peace.

Recent issues of the *Oregon Jesuit* carry items of scientific interest. There appears a list of calls of many Jesuit amateur radio operators in the Northwest. The province's mission in Alaska helps to stimulate this avocation. The issue for Oct. 1958 has an article on the Alaskan missioner, Fr. Thomas Cunningham, who is also technical advisor to IGY Camp *Iceskate* in the Arctic Ocean. In the same issue there appears a timely article on *Jesuits and the Moon* by Cornelius G. Healy which is all but a *Fasti Breviores* for geographical names.

Loyola University (Chicago) news, culled from the *Chemical Bulletin* of the Chicago Section of the American Chemical Society, 1958 convention issue, p. 56: R. P. Mariella's half-hour movie, *The Chemistry of Foods,* will be the seventh in a series of thirteen half-hour programs on nutrition which will be shown nationally over TV starting in October 1958. John L. Huston addressed the inorganic symposium at Northwestern University on *Isotopic Exchange Reaction in Certain Acidic Solvents.* Edward Lim, Ph.D., University of Oklahoma, recently joined the staff. Carl E. Moore and Arthur Maas presented a paper on the *Flame Photometry of Strontium* at the American Association of Spectrographers symposium in Chicago last June. James W. Wilt has received grants from the Research Foundation and from Sigma Chi to continue his research on the anomalous Hunsdiecker reaction.

Loyola University (New Orleans) College of Pharmacy. The Louisiana State Pharmaceutical Association has presented Loyola University College of Pharmacy with an $18,000 scholarship fund. The funds will be held in trust by Loyola to be used for the assistance of pharmacy students to be selected by the scholarship committee of the state association. The fund was first established in 1941 and was formerly administered by a five-man committee. Since its founding about sixty-nine Loyola pharmacy students have been given scholarship assistance amounting to more than $10,000. *American Journal of Pharmaceutical Education, 21,* 463 (1957).

Pharmacy Dean John F. McCloskey of Loyola University, New Orleans, La., passed away on December 9, 1957 after an extended illness. As vice-president of the American Association of Pharmaceutical Colleges, he was to have become its president for 1958, according to the Journal of that Association, Winter issue, 1957-1958.

The Spring issue of this Journal for 1958 carries memorials on the late John F. McCloskey, formerly Dean of the School of Pharmacy, Loyola University, New Orleans, and William A. Jarrett, late Dean of the Creighton University School of Pharmacy (pp. 240-243). A

number of selections from the writings of the late Fr. Alphonse M. Schwitalla, S.J., appear as fillers throughout this issue.

The Summer issue for 1958 carries a few items of interest to this ASSOCIATION. A posthumous address of the late vice-president of the American Association of Colleges of Pharmacy, John F. McCloskey, 1894-1957, of Loyola University, New Orleans, appears on pp. 276-278. There is a pen sketch of the author on page 276. Fr. William A. Crandell, S.J., former Dean of Faculties at Loyola is quoted in this article. Salvatore J. Greco, of Creighton University, chairmans the section for the teaching of pharmacy in the Association, and has been recently appointed Dean at Creighton to succeed the late Dean, William A. Jarrett.

The Department of Chemistry at St. Louis University periodically issues mimeographed bulletins and alumni news letters. The bulletin carries the names, academic background and research interests of the departmental staff. In addition 23 graduate fellows and assistants are listed. A list of departmental publications from 1950 to date is included in the current eleven-page issue of this bulletin. Fr. John J. Burns, S.J., of the Maryland Province, is listed as a research assistant; John Valenta, S.J., is listed as a graduate teaching fellow. The news letter divulges that Fr. George Tipton, doctorate alumnus, of Regis College, Denver, has spent a year working on a process for the concentration of low grade uranium ores. Prof. Stancil S. Cooper of the departmental staff passed away on January 9, 1958. A memorial of him is being planned in the form of a set of suitably inscribed journals to be placed in the department library.

Fr. T. J. O'Leary, S.J., Professor of Chemistry, Gonzaga University, Seattle, Wash., is a trustee of the Northwest Science Association (term, 1960). *Northwest Science*, Feb. 1958 issue, the official publication of this association, carries scientific 16 mm. film reviews: *The Voice beneath the Sea*, by Arnold R. Beezer, pp. 37-8; and *Mining for Nickel*, by David M. Clarke, p. 38. Both reviewers are Jesuit students of philosophy at Mount St. Michael's in the Oregon province. Mr. Clarke received the doctorate in chemistry from Northwestern, having worked with Malcolm Dole, before joining us. Gonzaga and Seattle University are institutional members of this association. Both universities were represented with one paper apiece at the 1957 meeting of the association: the former in the Botany-Zoology, the latter in the Chemistry-Physics-Mathematics Divisions.

The American Institute of Chemists lists 144 student medal awards for 1957, 21 of which went to students of Catholic Schools; ten of which are Jesuit: Canisius College, Fordham University, Loyola University (Chicago), Loyola University of New Orleans, Loyola

University of Los Angeles, John Carroll University, Xavier University, Boston College, St. Joseph's College (Penn.), and University of Santa Clara. [*The Chemist*, 34, (1957), 460-2.]

Papers read in the History of Chemistry Division of the American Chemical Society's San Francisco, Cal., Meeting, April 13-18, 1958 include: Scott L. Kittsley, of Marquette University, on the Niepce-Daguerre Partnership; and three papers by Mel Gorman of the University of San Francisco on different chemical enterprises in California, including the Food and Drug Administration's part in the history of chemistry in California.

American Chemical Society's 134th National Meeting held in Chicago, September 7 to 12, 1958, shows papers of approximately 68 authors from Catholic Colleges and Universities. Approximately 2700 authors of papers are listed in the program. Forty-four of these authors are affiliated with Jesuit institutions; the remaining 24 with non-Jesuit institutions. Fifteen authors were listed from the University of Notre Dame; 3 from Duquesne University; 11 from Fordham University; 10 from Loyola University (Chicago); 6 each from Georgetown and St. Louis Universities; 5 from the College of the Holy Cross (one paper); 2 each from Marquette University and Canisius College; one each from St. Joseph's College in Philadelphia; and 6 from various other Catholic Colleges; in all 44 authors from Jesuit, and 24 from other Catholic institutions.

An exhibit on the synthesis of the borazines comprised St. Louis University's contribution to the 10th Chemical Exposition held simultaneously with the national meeting.

R. F. Mariella, Head of the Chemistry Department of Loyola University is vice-chairman of the Chicago Section of the American Chemical Society for the coming year.

National Science Foundation awards and honors. The *Bulletin of the Albertus Magnus Guild* for April 1958 lists eleven first year awards to students of Catholic colleges and universities: two to Spring Hill, chemistry and biology; three to the University of Notre Dame, physics, engineering, and zoology; two to St. Louis, physics and earth sciences; and one each to Boston College, medical sciences; Holy Cross, mathematics; Rockhurst, chemistry; and the College of St. Thomas, physics. Jesuits in this list include: John W. Elder, S.J., Spring Hill, chemistry, and Anthony P. Mahowald, S.J., Spring Hill, biology. Editor notes that the Jesuits, Messrs. Victor Manjarrez and Paul J. Knopp have received extensions of last year's awards for the study of mathematics at Harvard University. Four faculty fellowships for Catholic colleges have been noted, including two to St. Joseph's College, Philadelphia, and one to Loyola University, Los Angeles.

Many applicants received notice that they would become eligible

for N.S.F. awards as funds became available. Hence we await belated reports. One such that has come to our attention is an award to Francis P. Fehlner, Holy Cross '56, for an intermediate fellowship at RPI in Troy, N. Y., chemistry.

Honorable mentions to Jesuits include: Robert J. Grant, Spring Hill, anatomy; Roland J. Lesseps, Spring Hill, anatomy; William W. Meissner, St. Louis/Canisius, psychology; Hobert B. Sullivan, Spring Hill, organic chemistry; Ugo Nacciarone, Spring Hill/Canisius, physical chemistry; Joseph K. Siberz, Gonzaga University, algebra; John A. Lutts, U. of Penn/St. Joseph's High School, algebra; Joseph A. Breton, Weston College, geometry; Edward W. Brande, St. Louis/Canisius, topology; Richard J. Prendergast, St. Louis, solid state physics; John Koehler, Spring Hill, theoretical physics; and Ramon A. Salamone, Spring Hill, organic chemistry. There may be other Jesuits who could not be recognized in the lists if they omitted the Society's designation from their applications.

Three thousand eight hundred took the NSF examinations; at least 1084 awards were made; honorable mentions tallied 1760; Catholic colleges showed more than 160 honorable mentions: about 85 to non-Jesuit colleges; and about 82 to Jesuit Colleges. The latter tallied: Marquette, 9; Boston College and Spring Hill, 8 each; Detroit, Holy Cross, Loyola Baltimore and St. Louis, 5 each; Fordham and St. Joseph's College Philadelphia, 4 each; Canisius, Gonzaga, Rockhurst, Univ. San Francisco and Santa Clara, 3 each; Georgetown, LeMoyne Syracuse, Loyola Los Angeles, and St. Peter's College, 2 each; and John Carroll, Loyola Chicago, Loyola New Orleans, Seattle, Weston and Xavier Ohio, one apiece.

Doctorate Production in United States Universities, 1935 to 1956, is the title of the latest National Academy of Sciences and National Research Council *Trytten* report, publication NAS/NRC No. 582, Washington, D. C., 1958, $2.00. It lists the number of doctorates in all academic fields (excluding law, medicine, etc.) over this period granted by American Universities as well as the number of bachelor alumni from various colleges and universities who received these doctorates. Various studies of this document are being made, and it might yet be too early to give it much coverage. Fr. William V. E. Casey, academic vice-president of Boston College, has made an extended study of Jesuit, Catholic and other colleges. Your contributor has made one on the doctorates among Jesuit alumni only. The study by Dr. Patrick Shanahan at Holy Cross is confined to Catholic alumni in the field of mathematics only and has been extended to the master's level as well. Without doubt other studies will be forthcoming, as with the earlier, but less comprehensive Trytten reports.

Das Wulf-Elektroskop is the new title of the third and enlarged

edition of an earlier work of Father Theodor Wulf's: *Elektrostatische Versuche*, Duemmler, Berlin, **1928**. This edition, bearing the subtitle: *Versuche aus der Elektrizitätslehre und Radioaktivität*, was published in 1958 by E. Leybold's Nachfolger, Cologne/Bayenthal, under the editorship of Dr. H. Kröncke. It contains 91 experiments in addition to descriptive matter in its 106 pages; seven of these experiments being newcomers to this third edition. It also contains a brief biographical sketch of the author from the pen of its editor which provides some new detailed information on the Jesuit physicist not elsewhere recorded. The sketch pays a sincere tribute to Father Wulf, but by distribution of emphasis, it is apt to leave the impression that his electroscope might have been Wulf's greatest contribution to physics. Leybold has inherited the manufacture of Wulf's instruments and has acquired publication rights to the book. The many accessories that have accrued to the use of the Wulf instrument over the years have enlarged this phase of electrometric studies into a field of techniques with which we have but slight familiarity in this country and which should be checked here as a possible alternative especially in the field of radioactivity. T. Klinger, 82-87 160th St., Jamaica 32, N. Y., distribute Leybold apparatus and booklets of experimental procedures in this country.—Ed.

A.C.S. PROGRESS REPORT NO. 31

Chem. & Eng. News, Apr. 7, 1958, p. 99, Progress Report No. 31 of the American Chemical Society provides data for an interesting study of our contributions to manpower in chemistry. The chemistry curricula of 22 Catholic colleges are approved by the American Chemical Society, 12 of which are Jesuit institutions: Boston College, the University of Detroit, Fordham University, Gonzaga University, College of the Holy Cross, the Loyola Universities at Chicago, at New Orleans and at Los Angeles, St. Joseph's College at Philadelphia, St. Louis University, the University of San Francisco and Seattle University.

Of the Jesuit institutions, Boston College certified 15 graduates with the B.S. in Chemistry out of the 2052 total certifications for the nation, to lead the Catholic schools, placing 29th with six ties among the 244 approved institutions in the country. Fordham came 36th with 14 certifications, this place shared by four other schools. Holy Cross came 41st with 13 certifications tied by seven other schools. Providence College showed 12 certifications. All others tallied less than 10 at the bachelor level.

The Catholic schools showed a total of 125 certified chemists: 74 from the Jesuit institutions; and 51 from other Catholic schools.

Holy Cross' third place among the Catholic schools is the one which the author has studied most carefully and he hopes his choice of it as an illustration will be condoned. In New England, Holy Cross had the sixth largest number of certifications: after Brown University 19, Boston University 18, Tufts University 16, Boston College 15, and the University of Massachusetts 14; tieing, however, at 13 with the Massachusetts Institute of Technology, Mount Holyoke College and Northeastern University.

Schools that have chemical engineering curricula generally tend to lose chemists to engineering. Thus the University of Detroit certified 18 chemical engineers but only 7 chemists; the University of Notre Dame, 41 engineers and 9 chemists; Villanova University, 21 engineers and 4 chemists. There are no other Catholic schools thus listed as accredited in chemical engineering.

Many graduate schools awarding doctorates in chemistry tend to have low numbers of undergraduate certifications. Harvard University, for example, awarded 21 Ph.D. degrees, 20 Master degrees, and certified 11 chemists at the bachelor level. In many of the *name* universities the number of higher degrees is about equal to the number of certifications at the bachelor level. It is generally known that a large number of institutions award a much larger number of B.S. Chemistry degrees than they actually certify to the American Chemical Society. Non-certified candidates do not *elect* all of the courses required by the A.C.S. For example, in many non-Jesuit universities the recommended, or at best most popular, course for pre-medical training is the B.S. in chemistry. The minimum one year of biology medical entrance requirement interferes with the full A.C.S. certification requirement.

Equally interesting is a study of the master's degree in chemistry from this report. It seems that the majority of universities grant an optional masters on the way to the Ph.D. degree. It is not always a *rain check*. In 1957, 153 schools granted 890 master's degrees, and 95 schools awarded 986 doctorates. So 58 of these 153 master granting schools did not grant doctorates. These 58 schools awarded 219 of

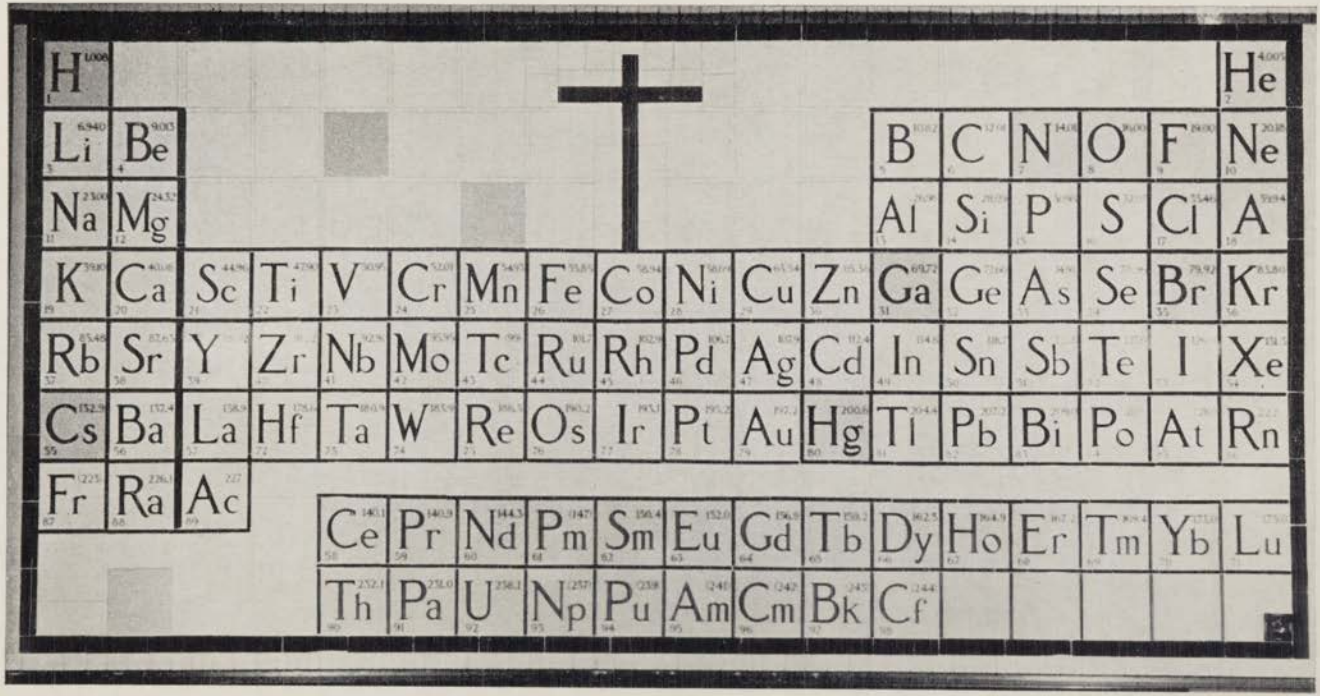
the total 890 master's degrees listed. Despite all of the recent unwarranted publicity against the master's degree that appeared within the past year in *Chemical and Engineering News,* the master's still shows a powerful minority among the two higher degrees, especially since 219 out of 890 can be regarded as a fair minimal estimate of terminal master's degrees. The number could be much higher, for there must be some terminal master's originating in the doctorate granting schools.

A disconcerting slant on the fate of the *terminal* master's degree in chemistry arises from a comparison of the 31st with earlier progress reports. According to the 30th progress report 154 schools granted 1011 master's degrees. Ninety of these schools also conferred Ph.D. degrees, leaving 64 schools that conferred master's only, without Ph.D. awards. This year, that number was decreased from 64 to 58 and the doctorate granting institutions have risen from 90 to 95. By the same token the over-all number of master awards has fallen from 1011 to 890 and the over-all number of doctorate awards has risen from 958 to 986. This increase of doctorate over the decrease of master's is expected to broaden in the years to come, since a few additional years are required for earning the doctorate. On the other hand these statistics may be abnormal due to adverse publicity for the master's degree in the professional press, copy of which falls into the hands of every A.C.S. Student Affiliate.

The master's degree in a large majority of our institutions arose 20 to 30 years ago out of the need for laboratory assistants or teaching instructors. The widespread practice of accepting research grants on campus over the last ten years or so has increased the competition for doctoral candidates, both as teaching and as research assistants. Indeed, it is a major concern in the American Chemical Society at present that pending congressional legislation may favor the research assistant doctoral candidates to the exclusion of the teaching assistants.

In upshot, many of our institutions have sound reason for wanting to extend graduate work from the master's to the doctorate level.

Of the 986 doctoral awards, listed in Progress Report No. 31, 38 came from Catholic schools, Jesuit schools accounting for 14. These are minimal figures. For, we know of one of our universities which shows great prowess in a given field at the doctorate level, yet it remains unlisted because its undergraduate department is not yet approved by the Society. Another Catholic degree awarding institution has no undergraduate program to be listed.



Periodic Table of the Chemical Elements, eight by eighteen feet, done in metal wall tile at the College of the Holy Cross, 1954. Photo courtesy of the *Holy Cross Alumnus*.