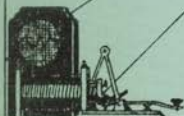


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### NOTICE TO AUTHORS

Manuscripts are to be submitted to associate editors of the appropriate section and may be submitted directly to the editor in chief. Clear manuscript, preferably typed, with wide margin to the left, with double spacing between lines, is desirable. Please try to follow the typographical style of the most recent issue of the BULLETIN. Line drawings should be submitted on Bristol board, or similar material, and done in India ink. Figure number should be written on this in pencil. Titles for drawings, with figure numbers, should be typed on a separate sheet. Please try to minimize footnotes. Appended references and bibliographies, clearly so marked, should be done in the style of the A.A.A.S. publication, *Science*.

## OBITUARY

REV. ALOIS GATTERER, S.J., 1886-1953\*

Born January 18, 1886 in Reichraming, Austria; having finished *Gymnasium* in Linz; and enrolled in the Society of Jesus in 1905; Alois Gatterer was ordained to the holy priesthood in 1915. He then specialized in physics and chemistry to earn his doctorate with distinction from the University of Innsbruck and joined the theological faculty of the University in 1924 and became Professor of Science and Philosophy in 1927.

Despite his vocational interest in the more general problems of science and philosophy, his forte seemed to lie in the exacter sciences. He was called to the Vatican Observatory to become founder of its astrophysical laboratory. At first he worked on the spectrochemical analysis of the Marquis de Mauroy Collection of Meteorites at the Vatican. His Holiness, Pope Pius XI generously underwrote the superb equipment for his work.

The need for exact, standard spectrograms in such work gave birth to Father's Atlases of the Spectra of the Chemical Elements: two of the volumes on the spectra of iron, and three on residual lines. Over the years this work found world-wide acceptance in spectrographic laboratories and enhanced good public relations for the laboratory and its director.

During the 1948 meeting of the International Astronomical Union, the Commission on Stellar Spectra asked Father Gatterer to compile a companion work on molecular spectra of interest to astronomers. For, he had had some success with carbon band spectra, free of atomic lines. So he extended this work to the investigation of metaloids by high frequency methods.

*Spectrochimica Acta*, a journal of international reputation, first appeared in 1938 under Father's co-editorship and grew old with a profusion of his contributions. With him at the helm, as editor-in-chief, this undertaking was to weather the trying years 1947-1949, until the Vatican relinquished its publication to the Pergamon Press in London.

The sterling mark on his work and the excellent repute of his institute attracted to the Vatican numerous guest workers who sought either an introduction to spectrography or the mastery of his advanced

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\*We are indebted to Fr. Ernst Salpeter, S.J., of the Vatican Observatory, for his literary obsequy of Father Gatterer, which appeared in *Mikrochimica Acta*, 1955, nos. 1-2, pp. 1-3, reprint of which he generously provided. A number of Fr. Gatterer's chemical contributions are listed by title in THIS BULLETIN, 34, 75-6 (1957): items 47-78 incl.

techniques. Busy as he was, he welcomed serious workers and helped them in every way he could.

His membership in scientific societies included the Papal Academy of Science, Honorary Membership in the French Society of Spectrochemists, Honorary Presidency of the Italian Society of Metallurgists, and the Microchemical Society of Austria.

One of the bright spots in professional satisfaction over a lifetime was a session of the International Astronomical Congress that was held in his own laboratory on the occasion of the 1952 meeting in Rome.

Failing health contrived to hospitalize him in Innsbruck late in 1952. Despite some convalescence, which raised his hopes for a while, the end was rapid, and on February 17, 1953, Father Alois Gatterer passed from this life.

His name will ever be identified with the contemporary rise of Modern Spectroscopy. His memory should ever be an inspiration to fellow Jesuits of scientific avocation. His dedication to basic research in interpreting the universe was delicately balanced by his keen philosophical and reverent theological purview of universal creation.

bafSJ

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## TIME-SAVING MULTIPLICATION

REV. JOSEPH A. PERSICH, S.J.\*

The special products in algebra may be used to introduce the student to the mental multiplication of two two-digit numbers having either the same tens' digit or the same units' digit.

The final form of each formula derived below gives the mental operations in order. Three examples are given to illustrate the thought-processes used in the application of each formula. With practice, the procedure can become almost instantaneous.

**A. Two Numbers Having the Same Tens' Digit.** Let  $t$  be the common tens' digit, and  $a$  and  $b$  the respective units' digits. The two numbers are  $10t + a$  and  $10t + b$ .

$$\begin{aligned}(10t + a)(10t + b) &= 100t^2 + 10ta + 10tb + ab \\ &= 10t(10t + a + b) + ab\end{aligned}$$

$$(10t + a)(10t + b) = (10t + a + b)(t)(10) + ab.$$

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\*Author teaches mathematics at Canisius High School in Buffalo, N. Y.

Note that  $(10t + a + b)$  is the first number plus the units' digit of the second. The following products show how this formula is applied.

$$\begin{array}{r}
 16 \quad [t=1, a=6, b=9] \\
 \underline{19} \\
 16+9=25 \\
 25(1)(10)=250 \\
 \quad 6(9)=\underline{54} \\
 16(19)=304
 \end{array}
 \qquad
 \begin{array}{r}
 37 \quad [t=3, a=7, b=9] \\
 \underline{39} \\
 37+9=46 \\
 46(3)(10)=1380 \\
 \quad 7(9)=\underline{63} \\
 37(39)=1443
 \end{array}$$
  

$$\begin{array}{r}
 42 \quad [t=4, a=2, b=3] \\
 \underline{43} \\
 42+3=45 \\
 45(4)(10)=1800 \\
 \quad 2(3)=\underline{6} \\
 42(43)=1806
 \end{array}$$

If two numbers have the same hundreds' digit, a similar formula can be derived and applied:

$$(100h + a)(100h + b) = (100h + a + b)(h)(100) + ab.$$

For example:

$$\begin{aligned}
 114(108) &= (114 + 8)(1)(100) + 14(8) = 12312; \\
 604(609) &= (604 + 9)(6)(100) + 4(9) = 367836.
 \end{aligned}$$

If two numbers are each slightly less than 100, this formula may be useful:

$$(100 - a)(100 - b) = (100 - a - b)(100) + ab.$$

For example:

$$87(96) = (87 - 4)(100) + 13(4) = 8352.$$

**B. Two numbers with the Same Units' Digit.** Let  $u$  be the common units' digit, and  $a$  and  $b$  the respective tens' digits. The two numbers are  $10a + u$  and  $10b + u$ .

$$\begin{aligned}
 (10a + u)(10b + u) &= 100ab + 10bu + 10au + u^2 \\
 &= 100ab + 10u(a + b) + u^2
 \end{aligned}$$

$$(10a + u)(10b + u) = ab(100) + (a + b)(u)(10) + u^2.$$



Note that adding as you proceed simplifies the work. The following products show how this formula is applied.

$  \begin{array}{r}  74 \quad [a=7, b=3, u=4] \\  \underline{34} \\  7(3)(100) = 2100 \\  (7+3)(4)(10) = \underline{400} \\  2500 \\  4^2 = \underline{16} \\  74(34) = 2516  \end{array}  $	$  \begin{array}{r}  28 \quad [a=2, b=9, u=8] \\  \underline{98} \\  2(9)(100) = 1800 \\  (2+9)(8)(10) = \underline{880} \\  2680 \\  8^2 = \underline{64} \\  28(98) = 2744  \end{array}  $
$  \begin{array}{r}  36 \quad [a=3, b=5, u=6] \\  \underline{56} \\  3(5)(100) = 1500 \\  (3+5)(6)(10) = \underline{480} \\  1980 \\  6^2 = \underline{36} \\  36(56) = 2016  \end{array}  $	

In mental addition and multiplication it is much easier to work from left to right. For example:

$$1500 + 480 = 1500 + 400 + 80; \quad 3(46) = 3(40) + 3(6).$$

## FUNCTIONAL ANALYSIS AND APPROXIMATION METHODS

FREDERICK A. HOMANN, S.J.

Many recent investigations in functional analysis have adapted the techniques of this discipline to study approximation methods for the solution of problems in applied mathematics. In particular, the Russian mathematicians L. V. Kantorovich and V. I. Krylov have used such methods to study the convergence and accuracy of linear approximation procedures. Their results have been published in Russian journals, but as yet have had only limited circulation in American schools. The motivation for such studies lies in the generality of the results obtained. Thus approximate solutions to a finite system of linear equations, to an infinite system of linear equations, and to a linear integral equation may all be studied in functional analysis by studying approximations of a bounded linear operator in the proper Banach space. It is the purpose of this paper to indicate how the techniques of functional analysis can give a unification to approximation theory for linear problems.

(1.) The starting point for the discussion is the concept of a *normed linear space*. Such a space is a set  $X$  of elements  $x, y, \dots$  of any nature for which are defined the operations of addition,  $x + y$ , and multiplication of the element by a real number,  $ax$ , subject to the ordinary laws of algebra. In addition, for each  $x \in X$ , there is defined a *norm*,  $N(x)$ , which satisfies the following conditions:

- a.)  $N(x) \geq 0$ ,  $N(x) = 0$  if and only if  $x = 0$ ;
- b.)  $N(x + y) \leq N(x) + N(y)$ ;
- c.)  $N(ax) = |a| N(x)$ ,  $a$  a real.

Convergence in  $X$  is defined in terms of the norm. Thus we say that the limit of the sequence  $(x_n)$  is  $x$  if  $N(x_n - x)$  approaches 0 as  $n$  becomes arbitrarily large. If every convergent sequence in the space has a limit in the space, then we term the space a *Banach space*. The following are some examples of Banach spaces and their norms.

Ex. 1.) The space of real or complex numbers where the modulus of the number is taken for the norm.

Ex. 2.) Euclidean  $n$ -space  $E^n$  where the points are treated as  $n$ -vectors, and the norm is taken as the length of the vector.

Ex. 3.) The space  $C$  of continuous functions  $x(t)$  defined on the closed interval  $(0, 1)$ . The norm is taken as the maximum of the absolute value of  $x(t)$  on the interval.

Ex. 4.) The space  $m$  of bounded numerical sequences  $(b_i)$ . The norm is taken as  $\sup_n |b_n|$ .

Other norms of course may be assigned to these spaces.

(2.) Suppose now that there exists a linear and homogeneous mapping  $H$  of the normed linear space  $X$  to a normed linear space  $Y$ , i.e.,

$$\begin{aligned} H(x + y) &= H(x) + H(y), \\ H(ax) &= aH(x) \quad x, y \in X, H(x), H(y) \in Y, a \text{ a real.} \end{aligned}$$

Such a mapping is called a *linear operator*. If  $Y$  is the space of the reals, the mapping is termed a *linear functional*. A linear operator is said to be *bounded* if there exists a positive  $M$  such that for every  $x \in X$  the inequality

$$N(H(x)) \leq M \cdot N(x)$$

is satisfied. The infimum of the set of all such  $M$  is called the *norm of  $H$* , and is denoted  $N(H)$ . Consider this situation for example. We let  $X = Y = C$  (the space of continuous functions on  $(0, 1)$  of example 3 in the preceding paragraph). A linear operation  $H$  carrying the continuous function  $x$  to the continuous function  $y$  is given by the integral operation

$$y(t) = \int_0^1 K(t,s)x(s) ds$$

where the kernel  $K(t,s)$  is continuous on the closed unit square. To estimate  $N(H)$  we write:

$$N(y) = \max_t |y(t)| \leq \max_t |x(t)| \cdot \max_t \int_0^1 |K(t,s)| ds,$$

$$N(y) \leq N(x) \cdot \max_t \int_0^1 |K(t,s)| ds.$$

Clearly the norm of the operation  $H$  does not exceed the second factor, and a consideration of specific functions  $x(t)$  shows that the norm of the operation is precisely the second factor.

(3.) The concepts of the first two paragraphs are used to prove the following important theorem:

Let the linear operator  $H$  carry a Banach space  $X$  into itself. Then if  $N(H)$  is less than 1, the functional equation

$$(1) \quad x = H(x) + y \quad x, y, \in X$$

has for any  $y$  a unique solution which may be found by successive approximations beginning with an arbitrary  $x_0 \in X$ .

That is, under the conditions of the theorem, a solution of an equation of type (1) is the limit of the sequence of functions  $x_1, x_2, \dots, x_n$ , where the elements of the sequence are obtained from

$$(2) \quad \begin{cases} x_1 = H(x_0) + y \\ x_2 = H(x_1) + y \\ \dots \\ x_n = H(x_{n-1}) + y \\ \dots \end{cases}$$

and  $x_0$  is an arbitrarily chosen element of  $X$ . Thus the theorem may be applied to the following cases.

Ex. 1.) We are given a system of equations in the unknown  $x_i$ :

$$x_i = \sum_{j=i}^n a_{ij}x_j + y_j, \quad i = 1, 2, \dots, n,$$

where the  $a_{ij}$  and the  $y_i$  are real numbers. Written in vector form the system has the form of (1):

$$x = Ax + y \quad x, y \in E^n, \quad A = (a_{ij}),$$

where the matrix  $A$  acts as operator carrying  $E^n$  to  $E^n$ . If  $A$  is symmetric, it can be shown that  $N(A)$  is the absolute value of the largest

eigenvalue of  $A$ . With the help of the theorem we can get the result that if all the eigenvalues of  $A$  are less than 1 in modulus then the method of successive approximations will give a solution to the system. Ex. 2.) We are given the infinite system of equations

$$(3) \quad v_i = \sum_{j=1}^{\infty} a_{ij} v_j + b_i \quad i = 1, 2, \dots \quad b_i \text{ real.}$$

Such a system is called *completely regular* if

$$\sum_{j=1}^{\infty} |a_{ij}| \leq q < 1 \quad i = 1, 2, \dots$$

If the sequence  $(b_i)$  is bounded, the system (3) may be treated in the manner of the above example as a functional equation of form (1) in the space  $m$  of bounded sequences. The operation  $H$  is given by the infinite matrix  $(a_{ij})$  and for a completely regular system it may be shown that

$$N(H) = \sup_i \sum_{j=1}^{\infty} |a_{ij}| \leq q < 1.$$

As a result a completely regular system has a unique bounded solution for any bounded sequence  $(b_i)$ . The solution may be found by successive approximations beginning with any bounded system of values. Ex. 3.) Let  $X = Y = C$ , and consider the integral equation

$$x(t) = \lambda \int_0^1 K(t,s)x(s)ds + y(t)$$

This functional equation also has form (1) where the operation  $H$  is the integral operation discussed in the second paragraph. If the norm of the integral operation is less than 1, then the theorem applies, and the sequence of  $x_n$  had from (2) converges to the unique solution of the integral equation no matter what continuous function we choose for the function  $x_0$ , provided, however, that the constant  $\lambda$  is less in absolute value than the reciprocal of the norm of the operation. Incidentally, this type of integral equation and its solution by successive approximations plays a key role in existence theorems of the Picard type for differential equations.

(4.) These applications taken from the theory of successive approximations indicate the generality of results had by use of functional analysis. There are of course other methods of approximation for linear problems such as variational methods, difference methods, and interpolation methods. It was in an attempt to unify the theory of all such methods that Kantorovich developed a general theory of ap-

proximate methods based on the theory of linear operators in a Banach space. Approximate solutions are analyzed by studying exact and approximate equations in different spaces. More accurately, Kantorovich studies the functional equation

$$y = H(x)$$

where  $x$  and  $y$  are elements of the normed linear spaces  $X$  and  $Y$  respectively, and  $H$  is a linear mapping of  $X$  to  $Y$ . Side by side with this equation he considers the "approximate" equation

$$\bar{y} = \bar{H}(\bar{x})$$

where  $\bar{x}$  and  $\bar{y}$  are elements of the spaces  $\bar{X}$  and  $\bar{Y}$ , and  $\bar{H}$  is a linear map. These spaces are chosen in the appropriate way to be simpler spaces than  $X$  and  $Y$  (for example they may be certain subspaces of  $X$  and  $Y$ ) and the operator  $\bar{H}$  is analogous to the operator  $H$ . This technique has been used in many specialized investigations, perhaps the most famous of which is Fredholm's theory of linear integral equations. In the Fredholm theory the linear integral equation is viewed as the limit of a finite system of linear algebraic equations so that the continuous function which solves the integral equation is approximated in the space of polynomials (a subspace of  $C$ ) and the integral operation is "approximated" by a finite transformation matrix.

Kantorovich develops theorems of two types. The first type establishes the solvability of the approximate equation and convergence of the approximate solution to the exact on the basis of data about the exact solution. The second type gives information about the solvability of the exact equation and the nearness of the approximate and exact solutions on the basis of data about the approximate solution. The usefulness of such theorems to the applied mathematician is apparent. Many of his problems can be handled only by approximation methods and it is important to know in advance the characteristics of such methods and the results to be expected.

Work is also being done by Kantorovich and other Russians on approximation methods for non-linear problems, but the theory has not yet reached the development of the theory of linear problems.

5.) This article was based mainly on a paper by Kantorovich appearing in "Upsekhi Matematicheskikh Nauk," 3, 1948 pp. 89-185. I am indebted to Dr. Bernard Epstein of the University of Pennsylvania for providing a translation for me. Reference may also be made to Kantorovich and Krylov, *Näherungsmethoden der höheren Analysis*, Berlin, 1956.

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The first installment of *Bibliography of Jesuit Publications in Chemistry*, THIS BULLETIN, 34, 71-6 (1957), requires the all important correction of distinguishing Jesuits from their non-Jesuit co-workers. The names of Jesuit workers follow—contribution item numbers appended: Brennan & Mulligan, 1; Brennan, 2; Caius, 3-14; Clarke, 15-17; O'Leary, 15; Duke, 18-21; Dupre LaTour, 22-38; Fiekers, 39-46; Gibson, 39; Gatterer, 47-78; Junkes, 49, 63-68, 71, 73-74. If there are other Jesuits listed, they are unknown to us. The names of Jesuit authors will be capitalized in this and future installments. *Ed.*

<sup>1</sup> See also item no. 108.

<sup>2</sup> JUNKES, J., co-author in items nos. 49, 63-68 incl., 71, 73 and 74.

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(To be continued)

### PROPOSED JESUIT RESEARCH ASSOCIATION

Out of the Conference of Jesuit Schools of Engineering, held in Ames, Iowa on June 28, 1956 has come the proposal to form a Jesuit Co-operative Research Association. It should embrace not only engineering, but pure science as well; and its scope might be extended to embrace whatever fields of knowledge are found in our academic curricula in the Assistency.

Among the many reasons given, with which most of us are familiar, the following might be emphasized. The pooled research potential of our manpower and our institutions would match that of the very largest in the land—possibly surpass any of them due to the breadth of subject matter to be found in our system. Our geographical distribution might be attractive to government and other agencies, especially in projects of a statistical or survey nature, even in astronomical, geophysical and possibly language projects. More cognizance of a group might be gained in the procurement of grants as contrasted with the recognition of an isolated specialist on an obscure post. Co-operative work between smaller units might eventuate.

Possible financial, jurisdictional and other organizational details have been worked out in part and are now under further study. Active promotion of the proposal comes from the University of Detroit. This proposal is being considered by each of the members of the Jesuit Educational Association at the Collegiate and higher levels and by the governing board of that organization as well. *baf*

## Science in the Province News

### BOSTON COLLEGE — BIOLOGY DEPARTMENT

A recently installed radiation biology laboratory provides adequate facilities for research utilizing radiations from an x-ray source and radioisotopes. A Campbell x-ray source, provided by the Keleket X-Ray Corp., will afford studies on the effects of ionizing radiations after partial or total body irradiation.

The procurement of radioisotopes provides tracer studies in physiology, cytology, and experimental embryology. Qualitative methods (radiography) and quantitative radioassay methods are currently being employed. The use of monitors, scalers, and counters provides accurate radioactivity determinations, and this equipment is available to the graduate Radiobiology course, class project work, and our advanced research program.

A new darkroom with a complete stock of photographic equipment was constructed for use of the faculty in their research and the graduate students in their course work.

With the idea of offering our better students a different program in their senior year, the faculty of the Biology Department currently is considering the adoption of a pre-medical honors course. The following are the desired objectives of this program: (1) to carry out an obligation to provide religious with academic training on an advanced level; (2) to allow a greater diversification of courses offered by the Biology Department; (3) to provide closer direction in research and academic fields and (4) to provide a spirit of research training for undergraduate students.

The new undergraduate Honors Course would consist of two semesters devoted to advanced study and research such as are found at present in the graduate school in addition to others being currently considered. This course will open only to A.B. or B.S. pre-medical students in their senior year who maintained for the first five semesters an academic standing of eighty-five percent or above. The selection of candidates for the Honors Course will be made after the third quarter of their junior year by a board of faculty members of the Biology Department.

The course will consist of two interrelated programs—research and academic. The research fields will be the same as those offered in the graduate research curriculum. All the data gathered will be writ-

ten in the usual thesis form and this paper will be accompanied by an oral defense of the thesis. The Honors Course candidate will be allowed a choice of graduate course electives in the academic program whose standards will be exactly the same as for graduate students with the exception that a numerical grade will be given, with sixty percent being the passing grade required. It is interesting to note the research opportunities which can be realized from a selection of such fields as physiology, radiobiology, cytology, endocrinology, ecology, histochemistry, etc.—all of which are being proposed as recommended courses in the new program.

Thus, a junior who had maintained a Dean's List average for two and one half years would be offered the opportunity of electing to follow the Honors Course on a purely voluntary basis. There would be no compulsion whatsoever to undertake the program; for it would be, admittedly, a more rigorous curriculum and would appeal only to a man willing to expend the extra effort and time.

However, if the course were chosen, the candidate in his senior year would elect four credit hours of research in a given field during the fall semester and during the spring term would select one graduate course (four credit hours) in place of histology and four credit hours of additional research in place of the usual elective (B.S.) or biochemistry (A.B.). He would be required to obtain a scholastic average as stated above and in addition would have to orally defend the thesis which had been compiled from his research data.

The current Biology graduate students come from Hawaii, Jamaica, B.W.I., India and in this country from Rhode Island, Connecticut, Pennsylvania, New York, Maine, New Jersey and Massachusetts. They represent a widespread list of colleges—Princeton, St. Mary's Dominican College, King's College, Manhattanville, Tufts University, Oberlin College, Mt. St. Vincent's (New York), Emmanuel, Regis, Holy Cross and Boston College.

Fifteen Juniors attended the Eastern Colleges Science Conference at Georgetown University from March 14-16. Ten undergraduate and graduate students will deliver papers at the Eastern New England Biological Conference which will be held April 27 at Simmons College.

A screening program has been drawn up by Fr. Lawlor for the Freshmen pre-medical and biology students. In the beginning of the first semester these freshmen were given a battery of tests which consisted of the California Short Form Test of Mental Maturity, The Essential High School Content Battery, Iowa Silent Reading Tests, Survey of Study Skills and the Wechsler Adult Intelligence Scale. It is hoped that through these tests the faculty might be in a better position to counsel their students. Fr. Lawlor has conducted interviews

as a follow-up to these tests and various classes in Reading and Study Skills improvement, and improvement and development of vocabulary and Objective Testing Techniques.

Dr. Walter J. Fimian, Jr. was a consultant in Radiobiology to a research group at the Boston City Hospital last summer. The Massachusetts Division of the American Cancer Society has recently awarded him a research grant to investigate the localization and selective cellular absorption of C14-Tyrosine by unmelanated, melanated, and S-91 mouse melanoma tissues as studied *in vitro* and *in vivo*.

Dr. Bernard J. Sullivan has completed three papers which will appear in the next issues of the *American Journal of Physiology* and the *Proceedings of the Society of Experimental Biology and Medicine*. His papers will deal with vascular responses to local cold injuries in the hamster and especially the influence of inositol on peripheral vascular responses.

Dr. Francis L. Maynard spent the past summer at the Aero-Medical Laboratory, Wright Field, Ohio conducting experiments on the effects of acceleration on the circulation of the cheek pouch and mesentery in the hamster. He has a review article on mast cells in collaboration with Dr. George Fulton of Boston University appearing in the next issue of *Physiological Reviews*.

Rev. John W. Flavin, S.J. has been accepted as an investigator at the Brookhaven Laboratories for eight weeks next summer. His work will be sponsored by the American Physiological Society.

Rev. Michael P. Walsh, S.J. was recently elected a director of the Mass. Society for Medical Research. A paper on a genetical study of Irish-Americans appeared in abstract form in September in the *Proceedings of the International Congress of Hermatologists*. An article on the Catholic Scientist and Evolution was published by the *Boston Pilot* (the Archdiocesan weekly) in December. Research on the effects of OMPA on mitosis in *Allium cepa* will appear in the forthcoming issue of the *Transactions of the American Microscopical Society*.

Rev. George F. Lawlor, S.J. was re-elected to the Board of Directors of the Massachusetts Zoological Society.

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#### BOSTON COLLEGE — CHEMISTRY DEPARTMENT

The Boston College Permeability Project is featured in the *Heights* for Jan. 11, 1957, page 8. Sponsored by the Atomic Energy Commission in conjunction with the Union Carbide & Chemical Corporation, this project is under the directorship of Dr. Andre DeBethune, B.S. St.

Peter's College; Ph.D., in physical chemistry, Columbia University; staff, Boston College. According to this notice, Dr. DeBethune and other scientists discovered in 1945 an effective and relatively inexpensive method for the separation of U-235, employing gas diffusion, which is now being used by the famous K-25 plant at Oak Ridge. Since October 1952, work has been going on at Boston College in an effort to perfect the process.

Henry Holt & Co., Publishers, carry Fr. Gerard M. Landrey's evaluation of P. W. Selwood's *General Chemistry* in their 1957 booklet issued this Spring.

Fr. Albert F. McGuinn, Prof. Chem., former Chrmn. of Am. Chem. Society's Chemical Education Comm. for the Council, has been appointed to a board of scientists for the selection of science teachers receiving NSF grants.

The Alumni Chemical Society held a Testimonial Dinner for Fr. A. F. McGuinn, on campus, April 11, 1957.

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#### BOSTON COLLEGE — PHYSICS DEPARTMENT

March 20, 1957, saw the beginning of a new research project in the Department of Physics at Boston College. Sponsored by the Air Force, studies will be undertaken on the properties of a plasma, or partially ionized gas, and their interrelationships. Particular attention is to be devoted to the interaction of such a plasma with strong magnetic fields. Partly theoretical and partly experimental, the study will be under the direction of the Reverend William G. Guindon, S.J., Chairman of the Department of Physics.

Air Force sponsorship came through the Cambridge Research Center's Geophysics Research Directorate. The Cambridge Research Center sponsors fundamental research in many areas of science, including several other studies being undertaken at Boston College, in the Departments of Physics and Mathematics, and at the Weston Seismological Observatory.

The contract allocates \$49,999.95 for the conduct of the project over the next eleven months. Assisting Father Guindon in the theoretical and experimental studies will be the Reverend John H. Kinnier, S.J., recently named Administrative Assistant of the Department of Physics, and Dr. Frederick E. White, Professor of Physics. Several graduate students and technicians will assist in various phases of the work.

Fr. James J. Devlin was elected Secretary of the Federation of Spectroscopic Societies, at the second meeting of the Federation, held



in connection with the Pittsburgh Spectroscopy Conference on March 7, 1957. Fr. Devlin sponsors the course on Modern Industrial Spectroscopy at Boston College each summer, now in its eighth year. It started in 1950 with an enrolment of 18 students; this year, as in the past four years, a full quota of 40 students is expected. The course will commence on July 15, 1957 and will run for two weeks. The course is particularly designed for training chemists and physicists in industrial positions to man new spectroscopic laboratories. Two hours of lecture and six hours of laboratory comprise the daily schedule. Specialists from the Baird Atomic Co., the Jarrell-Ash Co. and the College staff conduct this course.

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#### FORDHAM UNIVERSITY

Fr. Joseph F. Mulligan has been appointed acting chairman of the Physics Department replacing Dr. William A. Lynch who is to retire in June 1957. Recent departmental publications include: V. F. Hess, V. J. Kisselback and H. A. Miranda, Jr., Determination of the Alpha Ray Emission of Materials Constituting the Earth's Surface, *J. Geophys. Research*, 61, 265-71 (1956); work done on the Brookhaven Cosmotron towards Fordham Ph.D. degree by V. P. Kenney under the direction of Dr. Victor F. Hess appearing in: *Phys. Rev.*, 104, 784-94 (1956); and, Joseph F. Mulligan, S.J. and D. F. McDonald, Some Recent Determinations of the Velocity of Light, II., *Am. J. Physics*, 25, 180-92 (1957).

Fr. Walter J. Miller, of the newly established research institution, the Fordham University Astronomical Laboratory, Box 88, Fordham Univ., New York 58, N.Y., has sent to all Directors of Professional Astronomical Observatories, copies of *Ricerche Astronomiche*, vol. 3, N. 15, featuring some of his work, with a request for *exchange material*. This publication acknowledges grants from NSF.

Fr. Ewing began on Jan. 8, 1957 a new series of talks over WFUV on *We Are all Human*, a series concerned with cultural anthropology.

*Anthropological Quarterly*, 4 (ns), 91 (1956), devotes almost its entire issue to an article from the pen of Fr. J. Franklin Ewing (Fordham) entitled: *Human Evolution—1956*, with appendix: *The Present Catholic Attitude Towards Evolution*.

Dr. Leo K. Yanowski, of Fordham University, was honored as one of the six outstanding teachers of chemistry at the college and university level, and received a one thousand dollar award from the Manufacturing Chemists' Association at their 85th annual meeting, held at White Springs, W. Va., on June 6, 1957.

COLLEGE OF THE HOLY CROSS —  
CHEMISTRY DEPARTMENT

A new Science Building to house the Departments of Chemistry, Physics and Mathematics has been announced, construction to commence in the Spring of 1958. This three-story structure will rise at the upper Linden Lane exit of the campus, partly over the existing exit and north of the present Biology Building, thus completing a science unit in that sector of the campus. A branch of the College Library is envisioned in common for the three departments it will house. Certain classrooms will be used in common and a radiological laboratory to be used jointly by the departments of chemistry and physics is on the planning boards. The chemistry will be stacked in the west wing; physics, mathematics and most of the classroom facilities to the east. A foyer with library, elevator and other facilities will separate the department of chemistry from the other departments. A large lecture hall, to accommodate over two hundred students will be allotted to the Chemistry Department, with adequate lecture demonstration and other visual aid equipment, served by the central chemical stockroom on the first floor. The future exit of Linden Lane will parallel the present entry, if the contemporary plan is carried out. Departmental committees under Fathers Fiekers, Smith and Swords are hard at work on the details of inner construction.

Due to the insufficient number of qualified applicants for fellowship and Master of Science work in Chemistry, no appointments could be made for the coming year. We hope to resume the program in the year to follow and we urgently request ours to call the attention of qualified applicants to this worthwhile program, unique in its normally one-year requirement.

Prof. VanHook of the staff of the Chemistry Department received from Brooklyn Polytechnical Institute on May 4th, 1957 their certificate of merit to an outstanding alumnus.

Father Martus and Dr. Baril of the chemistry staff have rendered valuable service by judging at Science Fairs in Eastern New England this Spring.

Father Fiekers has accepted an invitation to teach General Chemistry in Los Angeles' Loyola University Summer School during July.

## GEORGETOWN UNIVERSITY

Georgetown University Chemistry Department has received a \$62,000 grant from USPHS for a five-year study of the basic physiology of muscle contraction to be made by Fr. Duke and Dr. Watanabe.

*Megimide* is the name of a new drug, successfully used in combatting the lethal effect of overdosage of barbiturates, according to a report on five cases by a team of Georgetown medical scientists.

Dr. Walter C. Hess, Chairman of the Department of Biochemistry in the Georgetown Medical School, has been named to the new post of Assistant Dean for the Co-ordination of Research. Research projects total almost \$600,000 annually.

There are three new courses being offered in Astronomy at Georgetown this semester: Advanced Geodesy, Experimental Geodesy and Practical Astronomy. Dr. Heinrich Eichorn, of the University of Vienna, and Dr. Angel Baldini, from LaPlata in the Argentine, have joined the Georgetown College Observatory Staff.

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## ST. JOSEPH'S COLLEGE

Drs. Beichl and Feighan of the Department of Chemistry delivered papers at the Miami meeting of the American Chemical Society. Dr. Feighan received \$3000 from the Research Corporation for work on exchange reactions of alkyl halides. We expect to open a research laboratory by September 1957, a pressing need in our graduate work.

Dr. C. B. Nash of the Biology Department has received a renewal of a grant from the Parapsychology Foundation of New York City, as announced in the *Hawk* for February 14, 1957. Research is being carried on under his direction in such fields as clairvoyance, precognition and psychokinesis.

From the same source we learn that Father John S. O'Connor spoke on the *Co-operative Course in Electronic Physics* at the meeting of the American Association of Physics Teachers in New York on January 31. Dr. Bernard L. Miller of the Physics Department also gave a paper at this meeting.

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## WESTON OBSERVATORY

Preliminary work is underway at the Observatory in cooperation with The Cambridge Air Force Research Center to study the hourly variations of the earth's magnetic field. This investigation is a part of the world-wide program in observance of the International Geo-

physical Year, 1957-1958. The equipment is presently located within the Observatory on one of the seismic piers, but eventually will be housed in a non-magnetic structure to be erected in the near-by woods.

The equipment consists of a Ruska Observatory Magnetograph which records variations of the vertical (Z) and horizontal (H) intensities and the declination (D) of the earth's magnetic field. A permanent photographic record 200 mm. wide and 500 mm. long, called a magnetogram, is obtained. The magnetograph consists of three variometers for Z, H and D, and a clock-driven recorder. In addition to the photographic recorder, experimental work is also being done with a pilot-model shadow-trace film recorder. Most recently, the installation of a Free Nuclear Precession Magnetometer, manufactured by Varian Associates of Palo Alto, California, was undertaken and the equipment should be in full operation very shortly.

In cooperation with the U.S. Coast and Geodetic Survey, the station seismologists have assisted in epicenter determinations of more than five hundred earthquakes since the first of July. Station personnel are also collaborating with the Dominion Observatory at Ottawa in a research project concerned with the direction of faulting of some of the larger earthquakes. Over the past six months, members of the Observatory staff have conducted approximately fifteen geologic surveys and twenty-five seismic surveys throughout New England and other sections of eastern United States.

Recent departmental publications include three case histories of geophysical problems written by Father Daniel Linehan, S.J. at the request of the Society of Exploration Geophysicists. The cases have appeared in the book entitled *Geophysical Case Histories*, Vol. II, published by the S.E.G. The articles deal with shallow refraction seismic techniques as applied (1) at Martins Creek at Lower Mount Bethel, Pennsylvania to determine depth to bedrock and the type of cover material; (2) at St. Peter's Basilica to assist the Archeological Commission in excavations beneath the Basilica in Rome; (3) in underwater studies in Boston Harbor to determine the depth and type of bedrock to be encountered in the construction of a sanitary disposal rock tunnel 26,000 feet long. Another article by Father Linehan, dealing with seismology as a tool for the power plant designer, appeared in a recent issue of *Electric Light and Power*.

The Fall-Winter lecture tour has kept members of the staff extremely busy giving more than seventy slide-lectures in Maine, Massachusetts, New York and Minnesota, while on the home front, more than four hundred visitors have enjoyed guided tours through the

Observatory. Numbered among the latter were the undergraduate geophysics students from MIT and a group of professional business men studying at the Harvard Graduate School of Business Administration.

Among the Alumni: Wayne Costley, B.C.B.S. '54, M.S. '56 is now employed by the Atomic Energy Commission in Washington, D.C. Francis A. Crowley, B.C.B.S. '50, M.S. '51 is with the Terrestrial Science Laboratory of the Geophysics Division of the Cambridge Air Force Research Center. Eleanor R. Sullivan, B.C.M.S. '56 is an instructor in Chemistry and Earth Science at Regis College, Weston, Mass. Vincent J. Murphy, B.C.B.S. '52, having just completed requirements for his Master's Degree, has enrolled at Pennsylvania State University as a doctoral candidate in Geophysics.

## Varia

Congratulations to the Jesuits who received awards and honorable mentions in the National Science Foundation Examinations. Honorable mentions listed in the Spring, 1957 examinations include: Louis E. Niznik, Spring Hill College in Biogenesis, first year; Joseph A. Burke, Fordham, in Anatomy, intermediate; Thomas S. Acker, Stanford University, in Entomology, intermediate; George L. Drury, Boston (Weston) College, in Pathology, intermediate; Ugo R. Nacciarone, Spring Hill, in Physical Chemistry, first year; Thomas E. McGranahan, Spring Hill College, in Geophysics, first year; John A. Lutts, Spring Hill College, in Algebra, first year; Joseph E. Billoti, Fordham (Shrub Oak), in Algebra, first year; John G. Marzolf, Fordham (Shrub Oak), in Theoretical Physics, first year; J. Joseph Coyne, Catholic University, in Theoretical Physics, first year; Richard J. Pendergast, St. Louis Univ., in Theoretical Physics, intermediate; and Robert S. Fitzgerald, Spring Hill, Physiology, first year. NSF Fellowship Awards went to Paul J. Knopp and Victor M. Manjarrez, both Spring Hill, pre-doctoral in Mathematics. Five other awards went to non-Jesuit students in Jesuit Colleges: one each to Boston College, Holy Cross, Loyla (Los Angeles), Loyola (N.O., La.) and St. Louis Univ. Other Catholic colleges listed for awards include: Univ. Notre Dame, 7; and one each to Manhattan, St. Thomas and Providence College. Approximately twelve Jesuit Colleges appear with the honorable mention accorded to about 52 of our students; about 77 honorable mentions were accorded to students in non-Jesuit Catholic colleges.

The contribution of Catholic Colleges to manpower in chemistry is reflected in the 30th Progress Report of the American Chemical Society, which appeared in *Chem. & Eng. News*, 35 (12), 51-56 (1957). The following brief study is limited to A.C.S. certified Bachelor degrees in chemistry awarded by Catholic Colleges, but with some reference to other institutions.

In 1956, 234 colleges and universities on the list of A.C.S. approved schools awarded 1951 A.C.S. certified degrees in chemistry; 18 Catholic schools among them awarded 152 such degrees; 9 Jesuit schools awarded 102 such degrees: Fordham, 27; Boston College, 19; Holy Cross, 13; Loyola (Chicago), 12; (next non-Jesuit St. Thomas, 11). Fordham University awarded the 9th largest number of degrees in the country; Boston College, the 20th largest number; and Holy Cross took 35th place, along with Oregon State, the University of Akron and the College of Wooster (Ohio).

In New England, Boston College had the 3rd largest number of certifications (19), after Harvard (22) and Mass. Inst. Tech. (20). Holy Cross' position in New England was 7th: after all Boston approved schools, except Tufts; after Brown Univ. and Mt. Holyoke College; but ahead of all six state universities except the Univ. of Mass.; and leader of the three approved schools in Worcester.

Significant observations include the following: the number of degrees from Jesuit institutions (102) is approximately equal to the combined number from the divisions of the University of California; where chemical engineering is taught, the number of pure chemistry degrees is apt to be low; City College, N.Y., led the country with 77 degrees awarded.

The 131st meeting of the American Chemical Society in Miami and Miami Beach, Florida enjoyed the greatest attendance of any of the Spring meetings of the Society held thus far. Forty-one authors from Catholic institutions were listed on the program. Your correspondent, Fr. B. A. Fiekers, S.J., of the College of the Holy Cross, in Worcester, Mass., represented the Cen. Mass. Sec. of the Society in the Council Meeting and attended the Council's Chemical Education Committee's meetings, open and closed sessions. He is a member of this committee. Other Jesuits attending the meeting include: one graduate student from Fordham University, one from the University of Notre Dame and two from St. Louis University. Twenty-one of the forty-one authors from Catholic Institutions came from Jesuit Colleges and Universities. Fr. George J. Hilsdorf, S.J., of THIS ASSOCIATION, and Fr. Ernest P. Bertin, S.J., of the Oregon Province, were co-authors of papers from St. Peter's College and the University of Notre Dame, respectively. At the meeting of the Albertus Magnus

Guild, held at Barry College on Thursday evening, April 11, it was learned that Dr. Frederick D. Rossini, Prof. Chem. and Chrmn. Dept. Chem. at Carnegie Tech. has a son who is a Jesuit novice at Wernersville, Pa.

Congratulations to Fr. L. Vollmyer, Golden Jubilarian, August 31, 1957, Xavier University, Cincinnati, Ohio.

Fr. Fahey at Kapuan Memorial High School in Wichita, Kan., has a semi-micro laboratory course in chemistry.

The American Meteorological Society presented a check of \$250 to the Institute of Technology of St. Louis University in memory of the late Fr. J. B. MacElwane on the first anniversary of his death. This sum will be given annually for an essay contest on some phase of meteorology. This contest will be open to full-time students in any college or university in the United States. Known as the Fr. James B. MacElwane Awards in Meteorology, their funds will be supplied by the Weather Corporation of America, located in St. Louis, Mo.

St. Louis University Chemistry Department reports that the will of the late Mr. James Gaffney of St. Louis places about all of his \$421,763 in a perpetual endowment fund with the bulk of the income, and eventually all of the income, to be used for support and maintenance of a chemistry laboratory at St. Louis University for the furtherance and development of science and the teaching of chemistry. Mr. Gaffney was an alumnus of the University. This release also includes a historical note in effect: it was just 50 years ago in 1907, that Father Cooney was appointed Professor of Chemistry, marking the beginnings of the Department. Naturally the teaching of chemistry at St. Louis is coeval with DuLong and Petit's 6.2 constant for atomic heats in 1819 or thereabouts! 80,000 students took the co-operative tests in chemistry last year. This A.C.S. testing program is under the direction of Dr. T. Ashford of the University. Dr. Schaeffer, departmental director, was recently appointed to the NRC-NSF screening committee for pre-doctoral fellowships. He already was serving on the NRC committee on Inorganic Nomenclature and the A.C.S. Committee on the Nomenclature of Organic Boron Compounds. He is receiving continuing support from ONR for his liquid ammonia system sodium-boron reaction studies and is a consultant for the Olin-Mathieson Corporation.

A scholarship of \$800 annually has been established by the Radio Corporation of America for students preparing for scientific teaching. The scholarship was accompanied by a gift of \$500 to St. Louis University. The National Fund for Medical Education recently announced a grant of \$44,330 to the St. Louis School of Medicine.

Fr. William Stauder (Mo.) has a research assistantship in Seis-

mology at the University of California and is looking forward to doctorate orals in the fall and then work on his dissertation.

Marquette University has instituted a course in Electron Microscopy in the Graduate School's Department of Anatomy. Two semester hour credit will be given. Dr. Weinreb will conduct this course.

Father Copeland, of the University of San Francisco, recently appeared on the TV program *Science in Action* and discussed the historical phase of the calendars used in the measurement of time.

Fr. Hubbard has been making splendid recovery from his stroke of a year ago and has undertaken several lectures in the Peninsula area, according to Univ. Santa Clara report in California Province News for February 1957.

*Boscovich and Particle Theory* is the title of an article from the pen of L. L. Whyte, appearing in *Nature* for Feb. 9, 1957.

Pre-medical students will assist the St. Luke's Physicians' Retreat Group of Greater Cincinnati, according to the *Xavier University News* (41, 15, 3.1.57), in sponsoring an exhibit at the Centennial Exposition of the Cincinnati Academy of Medicine. The exhibit is built around the theme of moral problems of medicine which Catholic doctors must observe concerning euthanasia, therapeutic abortion and the like. This is the only exhibit of its kind, presenting as it does the spiritual view of medicine in a materialistic world.

The Andrew Haley Jet Propulsion (Library) Collection was started at Gonzaga University a few years ago and is now being augmented from time to time.

According to the *Oregon Jesuit* for March 1957 (vol. 26, no. 3, p. 5), Fr. Arthur L. McNeil of Gonzaga University has been awarded a \$4,750 grant from National Institutes of Health for investigating the chemical composition of allergens. The work had been previously carried on under the ONR. Fr. McNeil is past chairman of the Inland Empire Section of the American Chemical Society.

*Facts on Fluoridation* by H. Treadley Dean, D.D.S. appears in *America* for Feb. 2, 1957, and should be helpful to many of our scientists who are consulted ubiquitously on this controversial question. Later correspondence on this topic included a letter from Dr. Lloyd F. Smith, Holy Cross alumnus and former instructor in biology at Holy Cross.

Fr. H. R. Jolley, Chairman of the Chemistry Department at Loyola University, New Orleans, was installed as Chairman of the Louisiana Sec., Am. Chem. Soc., at its annual dinner meeting, held at Loyola on Dec. 17, 1956.



At Loyola University, New Orleans, Fr. Gherzi, of the Paris Province, has received a \$20,000 grant from the Schleider Foundation towards work in meteorology.

Students of Fairfield Preparatory School became eligible for special awards offered by the United Aircraft Corporation for excellence in the study of mathematics, once it was made clear that the title word, *Preparatory*, should not imply that Fairfield is an exclusive school for the wealthy.

*Aus der Provinz* for January 1957 carries a lengthy item on Vatican Radio's personnel and programs. Since 1953, station management has been in the hands of Technical Director, Fr. Antonio Stefanizzi, who had worked under Nobelist, Prof. Victor Hess in New York (Fordham) and who is very zealous to keep the station abreast of the very latest technical developments. Broadcast programs and frequencies are listed. A new station is in prospect.

Fr. James J. Hennessey describes aerial magnetic prospecting for oil in the Philippines, and its dependence on studies of the ionosphere by the Manila Observatory at Baguio. This scientific *Jesuit Relation* is entitled: *The Little Bird who Lied*. It appears in *Jesuit Missions* for Jan.-Feb. 1957.

*Riverview (N.S.W.) College Observatory Publications*, directed by D. J. K. O'Connell, S.J., volume II., 1939-1951, carries a number of articles by its director, including the obituary of Fr. William J. O'Leary, S.J.

At the University of Detroit plans are being made for a new biology research building.

St. Paul's College in Winnipeg, Canada, a Jesuit Institution, will move from its downtown location to the Campus of the University of Manitoba, according to an article by Fr. John E. Page, S.J., appearing in *Church Property and Administration*, 21 (2), 64-67 (1957). This illustrated article describes the educational program and physical and architectural details. Building is in progress.

*Chemical & Engineering News* for April 15, 1957, page 46, describes Marquette University's John E. Surak's contribution to Chemical Education in the A.C.S. Miami meeting. He dealt with the problem of radial paper chromatography for the qualitative analysis of alloys—and by high school students at that! The item continues with a description of Mel Gorman's original experiments for freshmen in the identification of metals as electrodes in EMF cells. Prof. Gorman has been teaching at his Alma Mater, the University of San Francisco, since graduation in the early thirties.

*America*, for Feb. 9, 1957, introduces a new policy of featuring

science, under the editorship of Fr. P. H. Yancey. *Catholic Scientists Join Forces* is the title of Fr. Yancey's paper which describes the meeting of the Albertus Magnus Guild with the AAAS in New York, late in 1956 and outlines the history, work and purpose of the Guild. A *Directory* of members of the Guild is available from Fr. P. H. Yancey, Spring Hill College, Mobile, Ala., at fifty cents a copy. Fr. Charles A. Berger, of Fordham University, has contributed to this issue of *America* his article: *Science Looks at Life*.

Catholics attending the meeting of the American Physical Society and the American Physics Teachers in New York were invited to attend a dinner at Fordham University on January 31, 1957—arrangements in charge of Fr. Joseph F. Mulligan of Fordham.

Fr. Martin F. McCarthy, New England, has been appointed to the Vatican Observatory. He has given papers before the American and Pacific Astronomical Societies and has visited observatories; Case, Mt. Wilson, Palomar, Lick, Lowell, Flagstaff, Boulder, Climax and Dominion (Victoria, B.C.). He worked with J. J. Nassau in Cleveland until about Jan. 1, 1957.

USPHS grants for training personnel for public health positions were given to Loyola University, Chicago, \$4,118; and to Marquette University, \$8,010. (BAMG, Jan. 1957.)

Fr. F. X. Roser, Austrian Jesuit, naturalized Brazilian, first South American ever graduated from ORINS is taking part in the United Nations Committee studying the effects of radiation in the world.

Commonwealth Foundation has granted Loyola (Chicago) University \$30,000 to help defray expenses in the validation of the new medical aptitude test; Dr. H. A. G. Rimoldi directing.

John Carroll University's Vibrations' Laboratory was seen on live telecast, Sunday, Jan. 27, 1957, over KYW. Further, Fr. Birkenhauer presented an *Analysis of Displacements Caused by Quarry Blasts* before the Ballistics Laboratory of the Aberdeen Proving Ground.

*Missiles and Rockets* for December 1956, p. 93, notes University of Detroit's Missile and Rocket Section's work on the Thermochemistry of solid-fuel ramjet propellants.

Recent issue of *Alumni News* from the University of Scranton carries a center spread of pictures of Loyola (science) Hall, dedicated Dec. 8, 1956. Very Rev. John J. Long, S.J., president, stated that the new building is a pledge of our earnestness to bring men to God through the knowledge of the natural sciences.

The April 1957 issue of the *Journal of Experimental Physiology* carried an article by Fr. Joseph Pieters, of Xavier University, on Functional Zoology in developing the Chick Nervous System.

Kinescopes of Dr. Mariella's *Chemistry of It* series were telecasted in May 1957 by WQED in Pittsburgh and WCET in Cincinnati. The series is also scheduled for TV stations in St. Louis, Memphis, Detroit and Boston. Dr. Mariella is Head of the Chemistry Department at Loyola University in Chicago.

Fr. Ernest P. Bertin, of the Oregon Province, expects to receive his doctorate in chemistry from the University of Notre Dame in August and has been assigned to Seattle University for the coming year. His publication with Rev. T. J. Lane, C.S.C., and his director, J. V. Quagliano, entitled: Polarographic Investigation of Tetrakis-(ethylenethiourea)-Copper I Nitrate and of Thiourea-Copper I Complexes, received too late for current alphabetical listing in our *Jesuit Chemical Contributions*, appears in *Analytical Chemistry*, 24, 481-2 (1957). Fr. Bertin's article: *What do you mean, Special Studies?* which appears in the *Oregon Jesuit* for May, 1957 with portrait in a laboratory background, is an excellent specimen of the good public relations that science can provide for our seminary fund news bulletins and that such can provide for the manpower situation in science. THIS BULLETIN is a documentation mine of such material too.

Portrait and obituary of the late Fr. James B. MacElwane, S.J., in Spanish, from the pen of Fr. Ramirez, S.J., Director, appears in *Instituto Geofisico de los Andes Colombianos*, A II., Publ. no. 11, Bogota, Colombia.

*Bulletin de Liaison des Scientifiques*, S.J., no. 18 for Jan. 1957, scientific news bulletin for ours in the French Assistancy, carries notices of Jesuit scientific activity, including our own, like an earth-satellite with telescopic vision!

St. Louis University has received a Cottrell Grant of \$3600 from the Research Corporation for the support of Dr. G. A. Guter's project: *Correlation of Formation Constants of Organic Complexing Agents with Molecular Parameters of the Ligand*. The grant will provide for a research assistant at \$150 per month.

Mimeographed literature from the Chemistry Department of St. Louis University includes a four-page alumni newsletter, and a batch of official listings among which are to be found the department's list of publications 1950-1957.

*Ricerche Astronomiche*, 3 (16), Feb. 1957 carries: *Five Variable Stars in Cygnus VV 29-33*, from the pen of Fr. Walter J. Miller, of Fordham University.

## JESUIT SCIENTISTS AT CATHOLIC UNIVERSITY

Some notes, on Jesuit research in progress at the Catholic University of America, Washington, D.C., are given here.

The following report concerns some of the work being done by Jesuits from various Provinces for advanced degrees in Biology, Chemistry, Mathematics and Physics.

In Biology, Fr. William D. Sullivan (New England) is studying the sulfhydryl metabolism of irradiated and non-irradiated cells during the mitotic cycle. The proposed study is designed to localize various SH compounds in nuclear and cytoplasmic fractions of *Tetrahymena geleii* during various stages of the mitotic cycle; to study, quantitatively, the relative concentration of these compounds in the nuclear and cytoplasmic fractions during cell division and to study the incorporation of extracellular compounds (SH compounds) into the cell fractions of ultraviolet-irradiated and non-irradiated cells, before, during and after cell division. Cysteine, glutathione and cystine will be determined spectrophotometrically while a study of the incorporation of extracellular  $S^{35}$ -labelled amino acids will yield information about the rate of incorporation of these compounds into the cell during mitosis.

In Chemistry, Mr. Robert D. Cloney (New York) is concluding a theoretical investigation of a  $Be_4$  molecule in a square, planar configuration. The molecular wave functions used for the system are linear combinations of atomic wave functions. The coefficients in these linear combinations are varied to obtain a minimum energy for a given internuclear distance. The vertical ionization potentials and the electronic and total energies have been calculated for four different internuclear distances four times: a different approximation being used each time. In this way the validity of some of the approximations in use today will have quantitative verification. As expected, the system was found to be unstable, but the study is an interesting one due to the closed shell structure of the molecule, and the light it throws upon the value of exact integral evaluations in molecular structure research.

Mr. Donald I. MacLean (New England) is attempting to produce and identify some free radicals at low temperatures. When a stream of hydrazoic acid gas is passed through an electrical discharge and immediately onto a cold surface at  $-200^\circ C$ . a distinctive blue substance is observed. At  $-200^\circ C$ . hydrazoic acid is a white solid. The present problem is to identify this blue substance, which is very reactive even at this low temperature. Disconcerting explosions have proven its reactivity! An experiment is in progress to determine the life time of the unknown.

Mr. Robert J. Ratchford (New Orleans) is studying the palladium-hydrogen system. The experimental pressure-composition equilibrium diagrams of the palladium-hydrogen system in the gas phase are characterized by three regions. His research will constitute an independent method of verifying the plots in the hydrogen-poor region, commonly designated the alpha-phase region, H/Pd atom ratio less than 0.03. It has been found that the palladium-hydrogen alloy employed as an electrode in  $2N - H_2SO_4$  exhibits a potential with reference to the standard platinum reference electrode, and this forms the basis of the electrochemical method now briefly outlined. At given temperatures, the hydrogen content of a palladium electrode will be varied by anodic polarization, its potential will be measured with reference to a standard platinum electrode, and the hydrogen content will be determined by titration with ceric sulfate solution. Calculations using theory will relate these potentials at varying H/Pd atom ratios to pressure-composition points of the corresponding isotherms in the gas phase equilibrium diagrams.

In Mathematics, Mr. James F. Smith (New York) is working on a construction of the real number system by means of regular strictly increasing sequences of positive rational numbers. This method is here used in place of Dedekind cuts or regular sequences (possibly nondecreasing or nonincreasing) of both positive and nonpositive terms.

In Physics, Mr. Frank R. Haig (Maryland) is working in the field of theoretical nuclear spectroscopy. His current research centers on the developments in tensor theory brought about by the work of Giulio Racah. In particular, he is studying the group theoretical and tensor analytical methods needed to apply the Bacher and Goudsmit procedure, so successful in the atomic case, to the investigation of nuclear energy levels. He hopes to apply the procedure in the nuclear p-shell, especially to the nitrogen isotopes.

## Film Reviews

**Techniques of Organic Chemistry.** 4 parts: 11, 20, 11½ & 18½ min. resp. 16 mm. color (or b&w), Young America Films, Inc., Rental through Pix Film Service, 34 East Putnam Ave., Greenwich, Conn. Young America Films, Inc., 18 E. 41st St., New York 17, N.Y. distributes an 8-page flier which contains the narration script for these films. Dr. Louis F. Fieser of Harvard University carries out the demonstrations and part of the narration. The techniques are largely semi-micro. They include: Part 1: Fractional Distillation, MP, Rast MW; Part 2: Equipment, Crystallization, Clarification, Hot Filtration, Collection of Precipitate, Supersaturation; Part 3: Extraction, Countercurrent Distribution (manual), Elution Chromatography; Part 4: Martius Yellow Dye and its derivatives. The factual content over 60 min. is dense. It is recommended that students witness the four parts in a spaced program and that they be given opportunity to review the film often. *bafSJ*

**Principles of Chromatography.** 16 mm. sound, color, 20 min., made in England by Whatman, and available Dept. F, H. Reeve Angel & Co., Inc., 52 Duane St., New York 7, N.Y. After a brief historical introduction, simple adsorption of Congo Red on magnesium hydroxide in aqueous suspension is used to introduce this topic. Binary solutes are then separated using the same scheme. For a ternary solute system, partition chromatography is introduced, where silica gel supports the aqueous phase in a column. Three dyes are thus separated and then three organic acids, methyl orange aiding visibility in the latter case.

Paper chromatography is developed, starting with single ascending and descending solutes involving the separate analysis of five colored inks in appropriate solvents; on to the uni-dimensional partition of gelatin and egg albumin hydrolysates; and finally the further partition of components of these on bi-dimensional chromatograms. Development, drying and loop cleaning techniques are shown. A spot is cut out and eluted for quantitative estimation.

Such terms, as *elution*, *development* and  $R_f$  seem to be sedulously avoided. Strategic repetition and collapsed time demonstrations abound. Comparative methods of identification suffice for this stellar introduction to an otherwise difficult topic. *bafSJ*

**Hemo the Magnificent** is the title of Bell Telephone System's one hour science show on CBS-TV March 20, 1957. This second item in Bell's science series deals with blood circulation. Undoubtedly, these films will be released later for campus showing.