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EASTERN STATES DIVISION

VOL. XXV DECEMBER, 1947 No. 2

Obituary

REV. THOMAS HAROLD QUIGLEY, S.J.
1896 — 1947

On August 15, 1947, at Weston College, Weston, Mass., Fr. Thomas H. Quigley, S.J., was called to his eternal reward. He was born in Boston, on August 18, 1896, the son of John and Anna Quigley. After completing the high school course at Boston College High School, he entered Boston College in 1915 and was graduated with honors, (A.B.), in June 1919. During his college days he also took courses in Pharmacy and in 1919 successfully passed the Mass. State Board Examination, as Registered Pharmacist. At the end of the summer he entered the Novitiate of the Society of Jesus, at Yonkers, N. Y. Two years novitiate, one year of classical studies at St. Andrew-on-Hudson, Poughkeepsie, N. Y., and the three years of philosophy at Woodstock followed in order. It was during the years of philosophy that he developed his special interest in Physics and Mathematics. In the summer of 1925 he was assigned to teach Physics at the College of the Holy Cross, Worcester, Mass., manifesting marked talent as a teacher. After three years he was sent to Weston College to make his theological studies and was ordained to the sacred Priesthood in June, 1931. In September 1932 he matriculated at Johns Hopkins University for garduate studies in Physics and Mathematics, which he completed in 1938. The year 1938-39 was spent in the study of Ascetical Theology at St. Robert's Hall, Pomfret, Conn. In July, 1939, he was again assigned to the College of the Holy Cross as Professor of Physics where he remained until the end of the school year of 1945 and then was transferred to Weston College in the same capacity. He received his Profession in the Society of Jesus on Feb. 2, 1940. The degree of Doctor of Philosophy in Physics was conferred on Fr. Quigley from Johns Hopkins University, June 3, 1941.

Fr. Quigley possessed that happy combination of excellent talents and a full capacity to work. To the intellectual life of a Jesuit he devoted himself wholeheartedly and in his short years he accomplished much. In the spring of 1941 he suffered a grave heart attack which considerably curtailed his activity. To one of his energy it was indeed a trial. In true Jesuit fashion he accepted it without murmur or complaint. Rarely did he mention the bodily discomfort arising from his illness but he keenly realized that his physical strength was definitely limited and a severe handicap to the fulfillment of many worthy proj-

ects. This was perhaps his heaviest cross; he had the will to do but could not. He often tried what was beyond his powers but experience taught him that he must needs confine his activity to a rather narrow field. By nature he had a cheerful and happy disposition, ready to enjoy the pleasing side of life, and become an agreeable member of any community. At the same time because of his native ability he could offer a profitable contribution to a serious discussion. But there were others who were better acquainted with Fr. Quigley than myself and whose testimonials are of more value.

The following encomium was sent by one who for some years was of the same community as Fr. Quigley: "He was an extremely willing worker and never hesitated to share his knowledge with me, helping me to solve many difficult problems. He seemed to expect from others the same type of labor which he himself performed. His ideals were of the highest as was his love for the Society of Jesus. So much so, that despite my repeated urgings to take his preliminary oral examinations in order to be free to devote his time to other important tasks, he would not do so until he felt that he could pass them with honor and credit to the Society. More than likely you already know that after his final examination, Dr. Frank, Professor at Johns Hopkins University and a Nobel Prize winner, remarked that Fr. Quigley was twenty years too late. (Dr. Frank also said that he could hardly pass the examinations which Fr. Quigley had so successfully completed.) We had plenty of arguments and disagreed on many points, yet I never found him so wedded to his judgments that he was not willing to change his opinions when reasonable arguments were offered. He had an unfailing good humor and cheerfulness. I never knew him to become angry when the object of a joke. He could give and take but was never to my knowledge uncharitable. I admired him greatly, found him a loyal and devoted friend, a grand Jesuit. His life might be summed up in these words: he was a priestly priest, an exemplary Jesuit and the type of cheerful giver which I think that our Lord likes to find in those who have left all to follow Him."

Fr. Quigley's interests were wide and varied, and the very variety of these indicate the richness of native talent with which he was endowed. For besides his competent knowledge of modern Physics and Mathematics, he had a keen appreciation of the value of Seismology. It may not be well known but the present, very superior Seismological Station at Weston College owes much of its inception to his skill and initiative. Astronomy claimed his attention as is evident from the time spent in the Astronomical Observatory of Weston College. He gave much consideration to Education. He recognized the problems in this field and the changes in the pedagogical world, and realized the need of training students to meet the new outlooks. But from my experience with him I believe that his greatest enthusiasm, outside of his own special branches of science, was for Philosophy. He felt convinced that in the last analysis a solid philosophical knowledge would con-

tribute the most valuable help in the solution of many difficulties. We often spent many long hours examining the opinions of the Masters in Science, comparing them with allied doctrines of Scholastic Philosophy, resolving apparent contradictions and seeking some sort of an adequate solution for those troublesome problems which lie in the borderland of Science and Philosophy.

Speaking of Fr. Quigley's utter generosity which prompted him to give so much of his time and talents to others, one of his contemporaries has written: "Jesuit loyalty was one of the outstanding characteristics of his life. This was no mere sentiment nor mere wordy tribute. It found a concrete expression in his unselfish sacrifice of time and labor in aiding his brother-Jesuits. His devotion to duty was striking and even beyond this he did not spare himself when he thought that others might reap the benefit of his knowledge. Yet we all realized that on numerous occasions the urgency of his own duties would well have excused him from these beautiful acts of charity, had he chosen the easier way. While studying at John Hopkins University, Fr. Quigley organized a seminar for Jesuits working in allied fields. This seminar group consisted of Jesuits from Baltimore and Woodstock, who convened each Sunday of the academic year. At these meetings developments in the field of modern Physics would be discussed. That was the period in which the New Quantum Mechanics was evolving, and there were many inspiring sessions centered around both the physical interpretation and the philosophical implications of these new ideas. Such colloquia will be long remembered by the participants. At another period during his course at the University, Fr. Quigley again surrendered a considerable portion of his valuable time to teach a course in Advanced Mathematics at Woodstock. He volunteered to make this weekly trip to Woodstock so that the Philosophers specializing in the exact sciences should have the benefit of the knowledge he himself was acquiring." Perhaps few of us are aware of the innumerable hours Fr. Quigley devoted to tutoring others and to organizing special classes and seminars over and above his regularly prescribed work. In his death we have lost a wonderful friend and academic co-worker. Dr. John Hubbard, under whose direction Fr. Quigley studied at John Hopkins University, writes: "It is a hard loss, that of Fr. Quigley. He is irreplaceable in every sense of the word. For many years since he first came to John Hopkins he has been to me an unfailing inspiration to an active Christian life."

Those of us who were well acquainted with Fr. Quigley will give a ready assent to these beautiful tributes. In spite of his impaired physical strength since his illness in 1941, we recall his splendid success in reorganizing the Physics department in The College of the Holy Cross at Worcester to meet the pressing needs of war conditions and the increased student body. The members of the Association of Jesuit Scientists will cherish a fond memory of his lively interest and participation in the activities of the Association. He was Secretary of the Assn.,

1925-1927, and held the office of President, 1933-34. He was a member of the American Physical Society and a Fellow of the American Association for the Advancement of Science. We pay this tribute to the memory of his priestly charity and his high Jesuit ideals. R. I. P.

Rev. J. P. Kelly, S.J.,
Weston College

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An Experimental Determination of the Velocity of Sound by Dry CO_2-Free Air and Methane at Temperatures below the Ice-point. Physcial Review. Vol. 67; May 1, 1945, p. 298.

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* *In collaboration with Rev. T. J. Love*, S.J.

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Astronomy

THE ECLIPSE OF MAY 20, 1947

Rev. Francis J. Heyden, S.J.

As soon as Georgetown Observatory received the invitation to participate in the U. S. Army Air Force-National Geographic Eclipse Expedition to Brazil, Father Paul McNally and Father Francis Heyden set to work at once making plans for their observational program at the eclipse site. In 1940* at Patos in Brazil Father McNally had successfully measured the contact times of the eclipse with his own method which consisted of a silvered plane parallel optical flat filter mounted in front of a 3 inch Ross lens and a slow fine grain emulsion. This combination of filter and photographic plate permitted as many as 60 separate exposures of the full sun on an 8 by 10 plate with absolutely no trace of background fog between successive images. This same project automatically became a part of the Georgetown program.

In November of 1946 a partial eclipse of the sun gave us the opportunity to check the performance of our equipment for the determination of the contact times. The optical flat needed resilvering after seven years and while trying to determine the amount of the silver deposite, it was temporarily decided to experiment with a thin coat of aluminum. It also turned out that we were unable to obtain locally any 8 by 10 Microfile film or plates which was the emulsion used at Patos. The November experiment was performed with the aluminized flat and a Kodalith emulsion. It sometimes happens that compromise arrangement will actually prove to be an improvement. In this instance where the aluminum filter gave a more intense image of the sun than the silver, the Kodalith which is a much slower emulsion than Microfile made up for the difference. The results of the test were slightly better than those obtained with the Microfile, because of the greater contrast of the Kodalith. We decided to adopt the aluminum filter and Kodalith emulsion for the May 20, 1947 eclipse.

Another project which belonged naturally to our eclipse program was the photographing of the corona at the instant of totality. We planned to do this in two colors; in red light with a red filter and Eastman red sensitive plates and in blue light without any filter with Eastman blue sensitive plates. We adopted the very fast 103 type spectroscopic emulsions for this part of our program.

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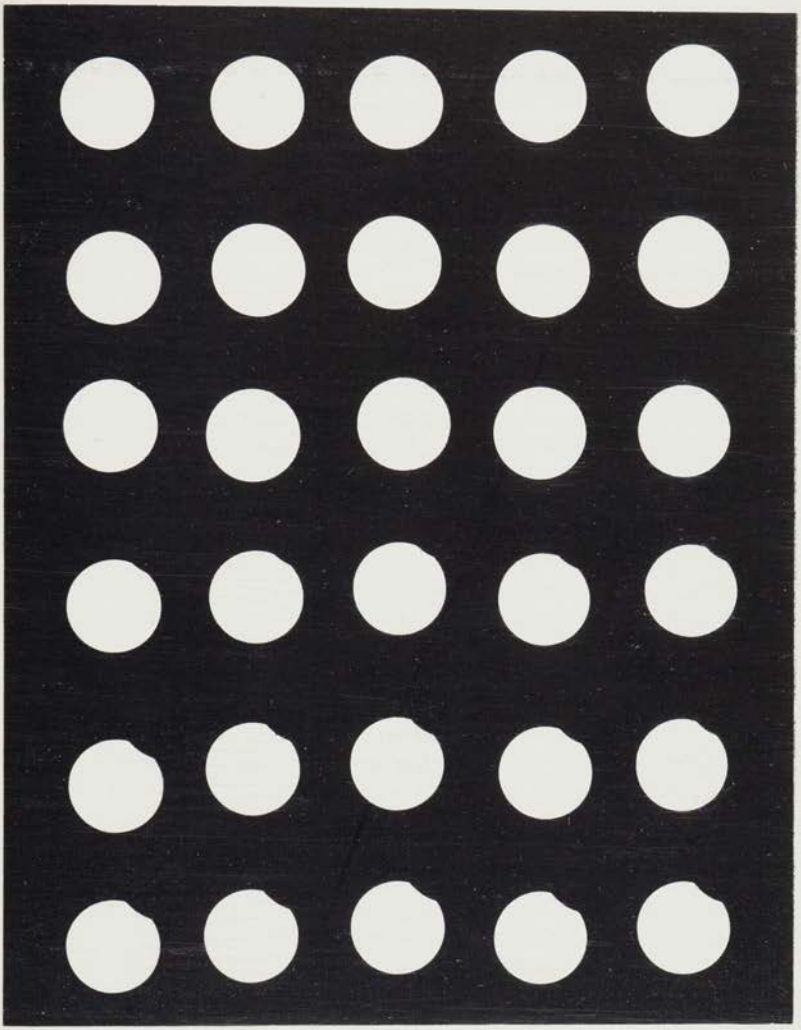
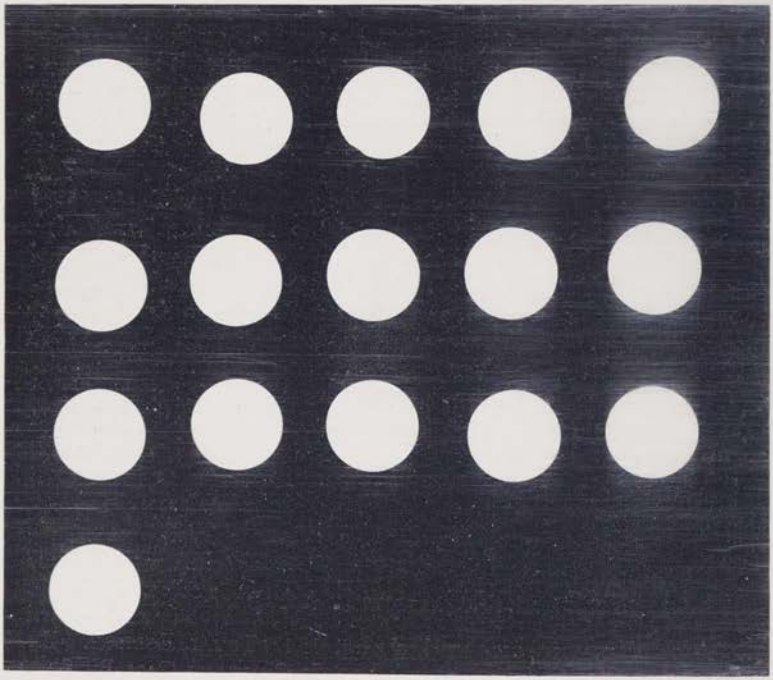
*—Jesuit Science Bulletin. Vol. XIX, #1. Oct., 1941.



K1. The Beginning of the May 20, 1947 Total Eclipse. Exposures Are 15 Secs. Apart. First Contact Can Be Seen on the Third Image from Top in Third Column from Left.

National Geographic Society-U. S. Army Air Forces photo.

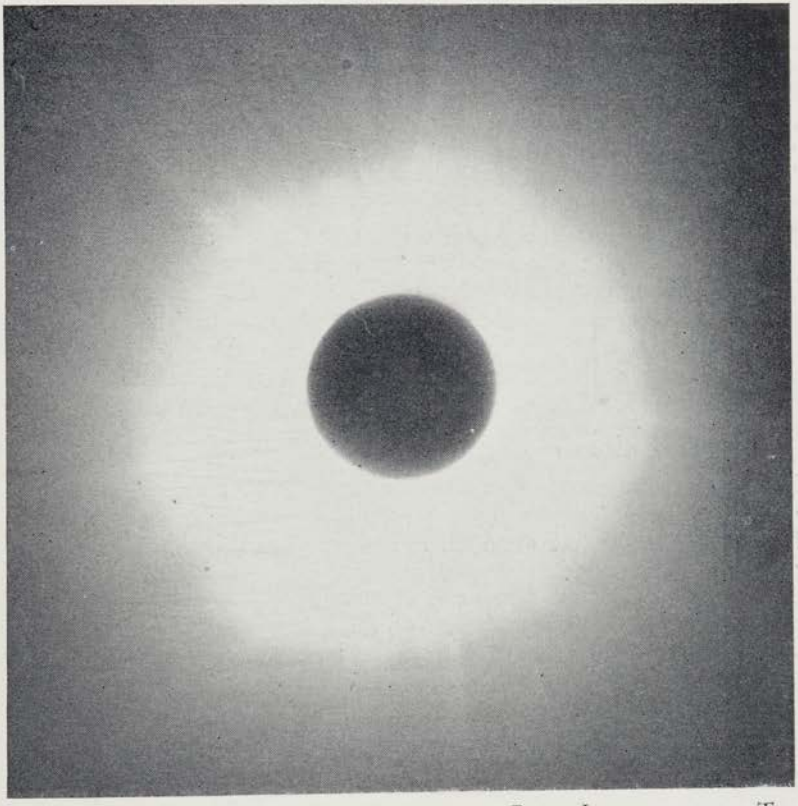
Furthermore, since we expected to have more than a month and a half at the eclipse site, we decided to put the Georgetown telescope to work on some observations of star fields which can only be seen by observers in the southern hemisphere. While making plans for this part of the program, we learned that it was possible to borrow the original 5 inch Ross lens and its camera, with which Dr. Frank Ross had made his famous Atlas of photographs of the Northern Milky Way. Why not assume that the weather in Brazil might be consistently good for at least a month and try to supplement Dr. Ross' Atlas with a series of photographs of the Southern Milky Way? The lens was obtained from Mount Wilson Observatory and the camera from Mr. Elmer of Perkin and Elmer Corp. in Glenbrook, Conn. Within a few weeks it was assembled and mounted alongside of the 3 inch Ross camera at Georgetown. Our next problem was to purchase a supply of 14 by 14 inch plates from the Eastman Kodak Co. for the 5 inch Ross camera. Our program required several dozen of these and in the meantime, Dr.



K21. The Ending of the Eclipse of May 20, 1947. Last Contact Can Be Seen on Third Image in Second Column from Left. Exposures About One Hundredth Second—Fifteen Seconds Apart.

National Geographic Society-U. S. Army Air Forces photo.

Baade of Mount Wilson Observatory persuaded us to try some long exposures with red sensitive plates. The largest filter which we could obtain for these photographs in red light was 12 by 12 n., and when it had been mounted in the special plate holder along with a 14 by 14 inch plate, the holder became a very heavy and precious object to handle. In the total blackness of a dark room the 14 by 14 plates seemed as large as billboards. They were of heavier glass than is usually found in photographic plates, and until we had worked with a few in our tests of the camera, we were in constant fear of cracking them in the plate holder. A plate of such dimensions has to be bent in at the four corners by pressure screws in the plate holder to correct for the curvature of the focal plane of the lens. Not a single plate was broken in the plate holder. All casualties with these plates occurred after development and drying.



TOTAL PHASE—5 Second Exposure in Blue Light of the Total Eclipse at National Geographic-U. S. Army Air Force Expedition in Brazil, May 20, 1947.

National Geographic Society-U. S. Army Air Forces photo.

The Milky Way program which consisted of 2 hour exposures in both blue and red light on twenty different centers provided a considerable amount of expense and work besides the eclipse preparations. But since these long exposures could not be made during the bright moon there would be at least two weeks in which we would have nothing to do. We prepared another program of shorter exposures in red and blue light on five variable star fields. By covering these we would have enough research material for a thorough study of about 30 Cepheid variable stars in two colors. A study of these would give us valuable information concerning the interstellar absorption of star light in one of the most important stretches of the Southern Milky Way, from Vela to Centaurus.

Hence we had plans that would keep us busy from almost the day of our arrival at the eclipse site until practically a month after the eclipse, if we wanted to stay that long.

With all preliminary tests with the Georgetown equipment concluded at home, the shipping department of the National Geographic Society gathered up the pieces of our telescope as fast as we dismantled it and packed them with expert care. When everything, including the wooden forms for the concrete pier, had been packed, we counted 19 boxes each weighing about 100 pounds on the average, save the one which contained the heavy base plate and equatorial mounting of the telescope. This last tipped the scales at about 600 pounds.

On April first the four motored army planes stood ready and loaded at the Washington airport. On one side of the aisle of our particular plane were fourteen seats for the scientific group and on the other side a few tons of the equipment stood neatly piled to the cabin ceiling and securely roped in place. The long plane ride was very relaxing mainly because of the freedom we were given as soon as the plane had reached cruising altitude. We were allowed to wander about the plane and survey the sights below from various angles through the tiny cabin portholes. Each stop on the route brought us to a different country where we had a few interesting hours of daylight in which to look around before going to bed for the night in rooms that had been officers' quarters of the American Air Force during the war.

As we headed toward the equator the airports where we landed became hotter and hotter. While standing on the black macadam air strips the interior of the big planes frequently became almost oven-like at temperatures over 120°. This gave us some concern for our red sensitive photographic plates and we had to spend a few hours hauling them out of the planes and into the commissary's ice box. We were fortunate in not having any plates spoil on the long trip.

At the eclipse site we wasted no time locating a position near the edge of the camp for our telescope. Within two days workmen were preparing a large concrete platform, 15 feet square, in the center of which we laid a wooden box to hold the form for the telescope pier as soon as it arrived. But the army personnel who were reloading the equip-

ment at the airport in Rio de Janeiro for the camp, decided that the bundle of old boards which we had brought along for the pier was of least importance. We had to use the radio three times and obtain the highest available priority to get the wooden form up to the camp. Within three days after its arrival we had the pier completed and the instrument ready for observations.

After getting the Georgetown telescope mounted and adjusted into position, we had just thirty-two days left before the eclipse. Fortunately we had not missed a single good night while waiting for the forms for the pier. The clear dry season was just beginning and the first ten nights in the camp were cloudy. But from April 16th until May 20th we had enough clear nights to keep us at the telescope for about 200 hours.

In the tropics the nights are long and we started observing at 7:00 A. M. We split up the night, Father McHugh taking one half and Father Heyden the other. This arrangement worked very well and enabled us to make up our sleep without spending too much time in bed during the day, when the din of camp life went on outside of our tent.

It was quite satisfying to see our long exposure Milky Way plates turning out so well as the month advanced. All of the large 14 by 14 plates had been coated with an antihalation backing, and all of our troubles arose from unevenness in this backing. A small bare spot or a scratch in the backing would change the background density of the plate and appear as a patch of bright nebulosity which really did not exist. All such plates had to be repeated, and this meant hard work for two hour exposures.

By the end of the thirty-two days we had most of our Milky Way program completed. Our variable star work could have gone on indefinitely but we had taken enough plates to provide research material for a thesis. Our big worry near the end of the month of clear nights was the performance of our shutter and filter for the observation of the eclipse.

On May 10th we began rehearsing for the eclipse. We rehearsed every step in the observations, even to loading and reloading plate holders with old plates. Every action was timed and fitted into its proper place. Two lieutenants of the U. S. Army Air Forces volunteered to help us so that we had a staff of four to run the telescope during the eclipse. We rehearsed every morning near the time of the eclipse so that our instrument would be pointed nearly in the same position in which it would be at time of totality. We repeated the performance after sunset so that we would be familiar with the darkness that would prevail during totality. After ten days of practice we had become a perfect team, and each one was able to not only check the other but to displace him if necessary. The full program of observation on the morning of the eclipse ran off as smoothly as if it were just another rehearsal.

To determine the times of contact of the eclipse by Father Mc-

Nally's method requires a long series of snapshot exposures fifteen seconds apart from the beginning of first contact to the last contact. We went into operation two minutes before the computed time of first contact, at 8:20 A. M. Brazil Time and continued until 11:02 A. M. We were the only ones who had such a long program to sustain, and before we finished the crowds who had come out to the camp to watch the eclipse had begun to go home. We finished, happy but very tired and uneasy lest we had overlooked something which might spoil our plates. We did not develop them until the following day. It was then that we felt the thrill of seeing the results of our work turn out satisfactory.

A slight cirrus haze had crept up over the sky after first contact. By the time of totality some cirrus clouds had moved up close to the sun so that they appeared on the 14 by 14 red sensitive plates which were taken during totality. The haze spoiled the perfect sharpness of the moon's edge and blurred the corona a little. Our longer exposures which were intended to pick up the faint streamers of the corona were fogged by light diffused by the haze. Our last exposure during totality was aimed to catch the first appearance of a Bailey's bead. The result was rather surprising since it showed irradiation streaming out from the bead for four or five solar diameters. This effect is obviously due to the cirrus haze.

Two days after the eclipse the scientific staff of the expedition began to dismantle their equipment. Georgetown kept its telescope in operation for two more nights after May 20th, but the strain of the 200 hours before the eclipse and of the eclipse itself was too much. We dismantled the instrument and packed all 19 boxes again in one day. We were ready to go home.

The results of the contact times have not yet been fully reduced. All of the plates have been measured and each exposure accurately timed. But there is a considerable amount of work to be done in order to compare the computed time of each exposure with the observed time. There are about 600 exposures. Preliminary results should be available by the first of the year.

The success of the expedition at Bocaiuva in Brazil can be attributed in great part to our prayers for clear weather. We can overlook the cirrus which was not serious as far as our program was concerned, especially after hearing the statement of the pilot of the B17 plane that flew at 30,000 feet over the site during the eclipse. The pilot saw beneath him a tremendous cloud cover which was broken only by a large wedge shaped clearing. Bocaiuva lay in the vertex of that clearing.

The U. S. Army Mapping Service is interested in our results. Our method for determining contact times may become an important project for future eclipses and it has the peculiar advantage of depending on the fact that an eclipse has to be total. One of the principal studies with this method may be the exact determination of longitudes.

Biology

THE ROLE OF PHYSICS IN THE PREMEDICAL PROGRAM

Rev. Michael P. Walsh, S.J.

Premedical students frequently fail to realize the importance of the general course in physics with regard to their future careers in medicine. They often ask why they should be forced to study this subject. When they consult general practitioners and other doctors they may be frequently told that the course in physics is relatively unimportant and that they will have very little need for the principles and applications generally given in their college course. The average physics teacher considers the course in physics far less important and useful to the premedical student than to the engineering student. Biology teachers would generally tend to consider the courses in biology much more directly related to medicine and therefore more important to the student than his course in general physics. This paper is an attempt to gather information on this subject from official sources such as medical schools and from authorities in medical and premedical studies.

The information and ideas expressed here are familiar to most physicists since they have been collected mainly from journals in physics. It might then seem more proper that this question be handled by a physicist rather than a biologist. But since the biologist is frequently the unofficial faculty adviser for premedical students and therefore is frequently consulted on such matters as the course in physics, it is important that he realizes the value of the course in physics and that he is able to give a correct answer to this question. It is for this reason that the author has dared to step out of his field to discuss this subject mainly for biologists.

Many surveys, articles, symposia, and joint discussions have been held between teachers and educators in the field of physics and those in the fields of medical training and practice. The American Association of Physics Teachers discussed this subject at their last annual convention (1). The American Association of Medical Colleges in 1936 conducted a series of papers on premedical education in their annual convention. The course in physics for premedical students was one of the subjects discussed (2). The Illinois State Academy of Science in 1944 conducted a survey on premedical education among the faculty and medical students of five medical schools in the state of Illinois. In their questionnaire (3) questions about the college course in physics were proposed to the faculty and medical students of these medical schools. The Alpha Epsilon Delta premedical fraternity has frequently discussed this question in their journal (3) and conventions. State academies

of medicine and premedical clubs in many colleges have conducted annual lectures by physicists on this subject. These references are only a few of the many references that have been published on this very important question.

Medical physics and biophysics are commonly regarded as new and recent. Actually, however, progress in medicine and biology has always gone hand in hand with progress in physics. Before there could be a scientific pathology, cytology, and bacteriology there had to be a microscope. The physiology of blood pressure would still be relatively unknown if manometers, galvanometers, and stethoscopes had not been discovered. The relation of physics to medicine and its importance in recent developments can easily be seen by merely glancing through the contents of a recent book published by Otto Glaser (4).

Every field of medicine applies the principles of physics to its subject. Dermatology uses radiation therapy. Aviation medicine is a field almost entirely devoted to pressures. Neurology applies the principles of electricity to the electric shock treatment. Radiology, surgery, orthopedics, and ophthalmology are divisions of medicine where the application of physics is obvious to all. Evaporation, radiation, conduction and convection play an important part in the control of body temperature. Electricity enters almost every study of nerves and muscles in the form of electrocardiagraphs, encephalographs and kymographs. Even the cyclotron and atomic physics have entered the field of medicine. A quick perusal of the book *Medical Physics* is sufficient to make one realize how important the field of physics has become to anyone in medical research or any field of specialization in medicine.

The importance of physics to biology is evident to anyone who has had a course in physiology or merely glanced through one of the standard textbooks in physiology such as Heilbrunn's General Physiology (5). Physiology has been briefly defined as the application of physics and chemistry to vital processes. Research in genetics, cytology, and embryology today is research for the most part in the physical and chemical aspects of these subjects. Biophysics is becoming very important in all branches of biology today. Loofbourow (6) has a splendid article on this subject and its development in the American Journal of Physics.

This is just a brief summary of the relation of physics to medicine and biology. The references already mentioned will provide a fuller treatment of the subject. These references should convince any premedical student of the importance of his course in physics to his future career and especially to his course in physiology in medical school. At least a third of the course in physiology is concerned with the application of physics to vital processes. Since the course in physics is presumed in all medical schools, a thorough comprehension of all principles in physics will make this course much easier. The rest of this paper is a discussion on the opinions of official committees and authorities on premedical and medical education.

A committee was appointed by the Association of American Medical Colleges to investigate the college course in physics and to recommend suggestions concerning it (7). Their findings were published in the form of two questions and answers.

"Should premedical students be compelled to pass the same first year course in physics that introduces pre-engineering students to that subject or should a special, easier, less mathematical course be presented with particular attention to biological or medical problems?" They answered this question by stating that the course in general physics should be designed to give the premedical student as thorough a grasp as possible of general physics. Medical and biological content, according to them, is of minor importance. If too much calculus is required in the course for pre-engineering students then a different course should be given to premedical students. But by no means should this course be watered or cut down. It should certainly be more thorough and comprehensive than the course that is generally given to non-engineering students.

The second question that they proposed was: "Is the present first year course enough for premedical students?" They answered this question by maintaining that no one but a physics major needs physics to a greater extent than a prospective physician. The committee recommended two years of physics rather than one for premedical students. The first year course should be identical in content with the course that is given to a physics major or pre-engineering student. The second year course in physics should be specially designed for embryonic physicians.

E. L. Harrington (8) has put this program into practice at his college. In the second year course he emphasizes the following: surface tension, osmosis, diffusion, viscosity, electrical instruments, electrolysis, the alternating current theory, optics, spectroscopy polarimetry infrared and ultraviolet radiation.

There is not, however, complete agreement among the authorities on the usefulness and need of a second year course. Grady and Chittum (9) received forty-one replies from medical schools to a questionnaire they sent out on the subject of requirements for medical school applications. On the question of an advanced course in physics, not one of the forty-one medical schools required advance physics for entrance requirements. Fourteen medical schools, however, recommended that the student have it.

Loofbourow (10) objects to a second year special course in physics for premedical students. He recommends more courses in mathematics. Every student, according to him, should have a working knowledge in algebra, trigonometry, analytical geometry, and calculus.

Bockstahler, who is perhaps the most prolific writer on this subject, recommends the following (11): "Let the first year course for the present follow the traditional pattern. If a separate second year course in physics is possible it should be given. However, most schools will find it impractical to do so. At the moment, texts, laboratory exercises, and suitable reading lists are not generally available for a distinctly medical

physics course. In general physics, as in any introductory course, much time must be devoted to acquiring a vocabulary of words, definitions, and principles. There may be some merit in not introducing unfamiliar terms from biology and medicine. Hence it seems wise to offer a second course in physics for premedical students. The second course would carry four to six hours credit. It should not merely be textbook in character. It should include laboratory, field trips to medical schools and biological laboratories, research centers, hospitals, and the manufacturers of medical equipment. . . . The objective of the trips would be to see physics in action and application."

The Illinois State Academy of Science appointed a committee to draw up a questionnaire and present it to the faculty and medical students at Loyola, Illinois, Northwestern, University of Chicago, and the Chicago Medical School (3). One of the questions that was asked was the following: "Do you think that premedical students would profit by an elective course in physics covering the principles and operation of instruments used in medical research and practice (i. e. Induction Coil, Electrocardiograph, Vacuum Tube, Generators and Amplifiers, Production of X-rays, Radio Activity, Principles of Optical Instruments)?" 280 faculty members answered *yes* and 32 answered *no*. 443 medical students answered *yes* and 152 answered *no* to the same question. 423 out of 505 medical students thought physics was one of the most useful premedical subjects that they studied in college.

Why is it that most premedical students find the general course in physics very difficult and uninteresting? Why is it that so few of them realize its value and importance? Most of these surveys place the blame for this condition principally on the physics teacher. The general course in physics or the first year course is usually steeped in the engineering and mathematical aspects of the subject. They seldom even mention applications to vital phenomena. The engineering student would hardly be interested in the course if the importance of bridge stresses was not given. So it is with the premedical student. Seldom does he hear any reference to medical applications of the principles he is learning. A large number of the Illinois Survey medical students (3) criticized the teaching methods of college physics. Most of them thought that physics "as taught" is not of great value, although more than half insisted it could be made exceedingly valuable.

It is clear that all these reports do not favor an oversimplification of the subject in order to make it more palatable to premedical students. But they insist that a confidence in the fact that a knowledge of physics is useful to them would do more to arouse enthusiasm at least among the best premedical students.

It might be objected that all this is fine in the realm of the ideal order but in practice it is impossible to carry out many of the recommendations that have been made in this paper. Physics teachers frequently complain that they find it difficult to get premedical students to understand the essentials and fundamentals of a general course even when they are spoon-fed, and that they never could give them a course

similar to the one they give to physics majors. The suggestions that have been made in this paper and in all the reports are intended for the premedical student that will definitely get into medical school. Less than a third of any premedical group is accepted by a medical school. In fact most schools are fortunate if they are able to place ten percent of their first year premedical students in a medical school. Certainly the majority of those accepted into medical school would be able to handle the same course that is given to physics majors and would become more enthusiastic about the course if only applications to medical subjects or at least part of an occasional lecture were devoted to their interests.

The American Association of Physics Teachers has authorized a committee to draw up a textbook or source book for biological and premedical students and to publish a syllabus or course book for the second year course (11). When this has been published perhaps physics teachers will be able to give a course that will remove many of the difficulties that medical students have raised against the traditional course that has been given to them in the past. There are a couple of texts in addition to Medical Physics that have been already published for premedical students (12, 13).

What can biology teachers do to help the premedical student realize the importance of this course? In most schools the premedical seminar or Mendel Club is under the auspices of the biology department. At Columbia University this year a physicist is giving one of the monthly lectures to the premedical club on this very subject. Many of the chapters of the Alpha Epsilon Delta fraternity have done the same in the past. In our schools where there are similar clubs it would be very profitable for the members to listen at least once a year to a physicist and a chemist discuss the relation of their subjects to biology and medicine. Biologists can offer to the physics teachers articles that may appear on this subject in biological and premedical journals. In science faculty meetings the developments of this subject in the literature might very profitably be brought to the attention of all the science faculty members.

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NATIONAL HONORARY FRATERNITIES FOR BIOLOGY AND PREMEDICAL STUDENTS.

Rev. Michael P. Walsh, S.J.

Everyone is familiar with such honorary fraternities as the Phi Beta Kappa and the Sigma Xi. The former is not peculiarly scientific but is open to all outstanding undergraduates and graduate students in any field. The membership in the Sigma Xi fraternity is restricted to individuals who have shown an aptitude for scientific research or as in the case of faculty members have shown noteworthy achievement as original investigators in any branch of science. The two fraternities that will be discussed in this paper are intended primarily for college biology or premedical students. They are restricted as in the other honorary fraternities to outstanding students but aptitude for research is not a necessary condition for membership as it is in the Sigma Xi fraternity.

In most of our schools premedical seminars or Mendel Clubs have been in existence for some time. The purpose of this brief description of the two fraternities is to acquaint faculty moderators with the activities of national organizations that might help them in directing their own local organizations. It is possible that some may be interested in establishing local chapters in one of the two national fraternities.

Tri Beta or Beta Beta Beta as it is officially known is a national honorary biological fraternity that was founded in 1922 and that has established local chapters in more than fifty colleges throughout the country. It is a society for students of the biological sciences which seeks to encourage scholarly attainment in this field. It aims to cultivate intellectual interest in the natural sciences and to promote a better appreciation for the value of biological study. This organization is therefore primarily interested in the study of biology.

The membership in each chapter is divided into three classes: active, alumni, and honorary members. An active member is a biology major who has a record superior to the average grade of the whole student body and who has completed at least three courses in biology. Some students who have not completed this last requirement may be accepted as provisional members. Alumni members are individuals who were formerly active members. Honorary members are people of outstanding achievement in some field of theoretical or applied biology. There is a charter fee of $10.00 for establishing a new chapter. $5.00 makes one a life member. There are no other national dues.

Each chapter holds scientific and social meetings. Lectures by outside speakers, movies on biological subjects, trips to research and medical centers, visits to museums, and student presentation of papers on biological subjects form the scientific meetings. Teas, dinners, picnics, and field trips form the social aspects of the club. A quick

perusal of any issue of *Bios*, the official pubilcation of the organization, will give a greneral idea of the activities of various chapters.

The national organization publishes the journal *Bios* four times a year. It presents articles of general scientific interest to biologists and reports of the meetings of local chapters. Another feature of their publication is their book review section. The national organization holds a convention ordinarily at the place and time of the meeting of the American Association for the Advancement of Science.

Fr. Frisch at Canisius College and Fr. Yancey at Spring Hill College have established chapters in this organization. Fr. Yancey is regional vice president for the Southeastern Region. These are the only chapters so far established at Jesuit colleges.

For further information on this fraternity or for copies of the constitution or subscriptions to the journal *Bios*, one may write to the Secretary-Treasurer, Dr. Frank G. Brooks, Cornell College, Mount Vernon, Iowa.

The Alpha Epsilon Delta Fraternity was founded in 1926 and has established more than forty chapters in this country. This organization is principally premedical in scope and nature. The object of the fraternity is to encourage excellence in premedical scholarship, to stimulate an appreciation of the importance of premedical education in the study of medicine, to promote cooperation and contacts between medical and premedical students and educators in developing an adequate program of premedical education, to bridge the gap between premedical and medical schools and to bind together similarly interested students.

This fraternity also has three types of members. An active member is a premedical student who has completed at least one year of premedical work and who has a scholastic standing of 75 in all subjects. An active alumnus is a member of the scientific or medical profession whom the local chapter deems worthy of membership. An honorary member is an outstanding physician or scientist whose nomination has been approved by the National Officers. Faculty members may be nominated as honorary members. The expenses of organizing and installing a chapter are about the same as in the other fraternity. There is a charter fee of $10.00 and a life membership fee of $7.50 for active members; $3.00 for alumni and honorary members. No other fee is paid to the national office.

Chapter activities include meetings where subjects of interest to premedical students are discussed by faculty members, physicians, and visiting officials from medical schools; dinners, teas and other socials, the showing of motion pictures of a medical nature; all-state premedical gatherings; trips to hospitals, medical centers, and medical schools as well as pharmaceutical manufacturers and laboratories. There are papers presented by the members on subjects of a background nature, such as the history of a specific disease; the development of a local medical school; the life and contributions of local leaders in medical education; socialized medicine.

The national organization publishes the journal *The Scalpel* four times a year. The articles in this journal are generally concerned with medical and premedical education. At the last annual convention in Louisville, Kentucky, the following subjects were discussed before most of the deans of medical schools in that area and representatives from each local chapter: Natural Sciences in Liberal and Medical Education; The Need of Liberal Arts in a Premedical Education by Fr. Hunter Guthrie, S.J., of Georgetown University; The Social Sciences and Humanities in Liberal and Medical Education. Each of the speakers was an authority in his field. Each issue of The Scalpel contains reports of meetings of local chapters and news of alumni members.

The following Jesuit colleges have already established chapters: Detroit University and Seattle College.

For further information on this organization or for a copy of the constitution or a subscription to the journal *The Scalpel*, one may write to the National Secretary, Dr. Maurice L. Moore, 3853 Lakewood, Detroit 15, Michigan.

Both of these organizations are honor fraternities and are therefore restricted to the best students in the school. Most seminars, clubs, and other organizations for biology and premedical students in our schools are not so selective but are open to all biology or premedical students that are interested in the organization. This does not mean that such a club or organization could not become affiliated with one of these national fraternities. Membership in the national fraternity could be restricted to the leaders in the local club. The other individuals could be designated in some other way as members of the local orgnaization. The advantages of establishing a local chapter in one of these organizations are such that they deserve the consideration of moderators of Mendel Clubs and other individual organizations. The national organization can give direction and assistance in forming interesting and enthusiastic local meetings. Every moderator of a local organization should subscribe to *Bios* and *The Scalpel*. In their quarterly issues he will find an abundance of suggestions and ideas for his own organizations.

The scope and nature of each of these two organizations is entirely different. In departments where the emphasis is placed on training biologists and only secondarily premedical students, Tri Beta would have the greater appeal. It is a biological fraternity interested in encouraging embryonic biologists. But in most of our schools the vast majority of students are primarily interested in medicine. Their study of biology is only a means to that end. Much as we would like to make the students more conscious of biology and interest them in the subject of animal and plant biology, we must face the fact that almost all of them are primarily premedical students. Since this is so, then the Alpha Epsilon Delta Fraternity would appeal more to them. At least a familiarity with the publications and activities of this organization is very worthwhile.

Chemistry

"ATEX" DURING THE JAPANESE OCCUPATION

Rev. Eugene A. Gisel, S.J.

"Atex is the trade name for the products of the College of Industrial Technology, Ateneo de Manila, the Philippines. It is made up from the first syllables of the words ATEneo TECHnology. To the small boys of the Ateneo Grade School "Atex" stood mostly for the soft drinks with highly colored labels on the bottles, and a wholesome drink inside. To the High School and College students of the Ateneo it was a shortened name of the college that was founded in 1936 to train Filipinos for the industries so badly needed by the new government. Around a core of a four year course in Chemistry was built added courses in Industrial Microbiology, Elements of Engineering, Business Management, and specialization in Food Technology, Dairy Industry, Leather Tanning, Fermentation and Beverages, and Soap and Toilet Articles. The semi-commercial laboratories in which practice was given in these various industries served a very useful purpose during the Japanese occupation, and a brief account of this is the purpose of this article.

CHEMICAL AND INDUSTRIAL EXPOSITION

The faculty and students of Industrial Technology and of the Chemistry Department of the Ateneo had been working hard for about six months in preparing for the Chemical and Industrial Exposition which would open on Dec. 7, 1941. The Exhibits included models of chemical industries, typical chemical reactions, flow sheets and products of about 50 American and 15 Philippine industries, products of the P. I. Bureau of Science, National Food, National Coconut Corp., and the first charcoal-burning engine, made by an Ateneo alumnus, for autos. (Many of these were made later when the Japanese cut off the supply of gasoline for civilian use). The Exposition occupied the six one-story science buildings, a total floor area of about 27,000 sq. ft., and several booths on the grounds. On Dec. 7th in the afternoon the Secretary of Agriculture and Commerce gave the main speech at the opening of the Exposition, and about 2,000 visitors viewed the exhibits.

Early the next morning, Dec. 8, (Manila time) the bad news came over the radio and appeared in the early editions of the newspapers. The first telephone call I made was to Fr. Leo Cullum, S.J., Rector of San Jose Seminary, telling him not to send in the Seminar-

ians that morning as the North Road which led past their building would probably be choked with Army traffic heading north to hold off the expected invasion. The first call I received was from the Director of the Far Eastern School of Aviation saying he would send out a couple of mechanics to take down the Piper Cub plane which they had set up on one of the basketball courts. No Jap planes appeared over Manila, and visitors continued to come to the Exposition all that day and the next. Some of the exhibitors started to withdraw their exhibits on the third day. I hated to see some of them leave. For example, the National Food Corp., with its many cases of canned foods, Lissar Soap Co., with its display of soap and toilet articles. The Bureau of Science with its Vitamins and quinine products, the National Coconut Corp., with its varied output from the versatile coconut tree (but they left their booth, which we later made into a chicken house). But many of the exhibits were left with us, including all the U. S. and some of the P. I. industries: a six-foot high copper still which was useful in making alcohol, copra cake which became good feed for the chickens and ducks, straw hats which shaded the Jesuits who were soon digging up the playing fields and planting camotes (sweet potatoes) and peanuts, floor polish which was made into a good grade of shoe polish, soft drink flavors, a 6.00x16 tire that brought in $300 when sold two years later, and many other articles too numerous to mention.

OUR WAR EFFORT

On the first day of the war Very Rev. John F. Hurley, S.J., Superior of the Mission, offered the facilities of the Jesuits and their property to the authorities for the prosecution of the war effort. To implement this I offered the use of our Chemistry laboratories to the Chief of Chemical Warfare, U. S. G. H. Q. With the approval of the Rector, Rev. Francis X. Reardon, S.J., I asked the American Red Cross to set up an emergency hospital at the Ateneo in case the Japanese bombed Manila, and to train our men in First Aid work. This was done, the hospital serving many civilians and some Army men until the evacuation of the Army to Bataan, where it was then transferred. The First Aid units did heroic work in the bombings that occurred along the water front and at Nichols Field. The Ateneo lent many of its beds to several other emergency hospitals. The Red Cross sent us chemicals for making temporary gas masks, of which we made some and were prepared to make thousands, but no need of them arose. On the 13th of Dec. when Nichols Field took a particularly vicious bombing, and all their supplies were blown up, the purchasing agent asked for a ton of battery acid, which I gave him from our stock. After the Japanese occupation several students came to me for materials for making incendiary bombs, so I showed them how to make them from white phosphorus dissolved in carbon bisulfide. To the American and Filipino guerrillas in the hills we sent medicines, chemicals for purifying drinking water, and some liquors from the Fermentation

Laboratory. (I do not mention here the food and money and clothing contributed by Fr. Superior to the guerrillas, as that is outside the scope of this article).

WHILE MANILA STOOD

The Japanese made landings on northern Luzon on Dec. 10, and on southern Luzon two or three days later, and swiftly developed their pincer movement on Manila. During those three weeks, of course, Manila was in a dither. Almost every day at noon 54 to 81 Jap planes would fly high over the city in perfect formation, no opposition, on their bombing forays to Nichols Field, the ships in the Bay, or the piers, or other objectives to the South. Every night there would be two or more air raids necessitating a quick trip downstairs to the stronger part of the Ateneo. Despite the fact that my three laboratory boys left for their families in the Provinces, we carried on our ordinary production with the help of the Scholastics: making soft drinks, pasteurizing and homogenizing milk from sweet butter and skim milk powder, making ice cream twice a week, syrup for the pancakes, breakfast orange juice, etc. The influx of Jesuits from other houses into our community demanded a larger production than formerly, but all demands were met.

I was faced now with a dilemma: should I lay in a large supply of raw materials for the future on the supposition that we would have continued use of our laboratories? Or would we all be interned in a concentration camp as soon as the Japs occupied Manila, and therefore should I use up the supplies I had on hand?

THE FALL OF MANILA

By Christmas all Jesuits in Manila and vicinity, except for a skeleton crew at each house, were quartered at the Ateneo. Towards the end of December things were rather gloomy, not brightened one night by an intensely white light from the burning ammunition depot at Cavite 13 miles away, nor by the 8 huge columns of black smoke rising one mile high from the stocks of oil and gasoline set on fire by Army personnel on the outskirts of Manila. The armed forces finally pulled out of Manila, and on Jan. 2 we found Japanese soldiers outside the main entrance of the Ateneo. On January 6 Japanese soldiers brought a small bus to the Ateneo to intern all the Americans; a hurried telephone call by Fr. Superior to the Japanese Religious Section postponed this, and eventually it was decided that the American Jesuits would be interned on the Ateneo grounds. This set us at ease, for it allowed us to continue our religious life, help out in the parish churches on Sundays, give retreats, etc. in Manila, and be a source of hope and encouragement to our Filipino friends. These soon overcame their fear of the Japanese guards and began again to attend daily Mass and religious services in our chapel.

PRODUCTION OF "ATEX" PRODUCTS

Being interned on our own grounds allowed us to continue work in the laboratories. During the previous three weeks I had bought all the sweet butter my deep freeze would hold, about 256 lbs., and 800 lbs. of skim milk powder; ordinarily this would be sufficient to supply the community with milk and ice cream for a year. Despite the large increase in our numbers, we were able to stretch the milk supply to eight months, and the ice cream to about seven. I also bought a ton of white sugar and about a ton and a half of raw sugar. When this was used up, and no more sugar was available except at an enormous cost, we bought 5 gallon tins of muscovado (a crude brown sugar containing a great deal of molasses, the old product of boiling down sugar-cane juice on the plantation, in use before centrals and refineries were built). Later I bought 4 tons of thick sugar syrup with shredded coconut in it, put up in 5 gallon gasoline cans. We strained out the coconut, added sugar syrup to cut down the heavy coconut flavor, and used it to put on the cornmeal mush and muffins which constituted our breakfast until the day we were put into concentration camp. (Incidentally, the 5 gallon tins which cost, with the coconut syrup in them, $5.00, were later sold, empty, for $5.00 apiece). The shredded coconut we used to make candy occasionally, the wash water was fermented and distilled into alcohol. When the raw materials for milk were exhausted, I started to buy coconuts at a cent and a half apiece, and from these we made coconut milk, a very nutritious drink. The laboratory boys (who by this time had returned to their old jobs) split open the coconuts, took out the meat, which we shredded in the Hobart Food machine, and extracted with hot water.

Field corn was bought, fumigated with carbon bisulfide to kill the weevils, and ground into cornmeal, in a hand grinder to which the mechanic has attached a 1-4 H. P. motor, and in an electric coffee grinder. The screenings were fed to the ducks and chickens which were given us by a Britisher interned at Santo Tomas. The cornmeal for our breakfast for the two years and 6 months that we lived at the Ateneo, not only for the Jesuits, but also for the two hundred or so American and British internees, old men, or women with children who were quartered with us by the Japanese.

We had plenty of sugar and flavors on hand for soft drinks, but carbon dioxide was another matter. We used to buy cylinders of this in Manila, but that firm was now in the hands of the Japanese. So we started to make our own from sulfuric acid and bicarbonate of soda. The latter was fairly cheap, about 7c per lb., and we had a stock pile of 3 years supply of the acid on hand. We put a kilo of the bicarbonate in the cylinder, added water, turned the cylinder on its side and quickly pushed in 20 testtubes, inverted, containing concentrated sulfuric acid and closed with a thin cork. The cap was screwed on, and the cylinder rolled on the floor; the acid quickly ate thru the cork and reacted with the soda.

We stopped our production of sausage, jams and bacon, and other meat products, because the price of meat rose immediately with the coming of the Japanese. Later on when we started raising pigs on the grounds, we processed the head, liver, etc. into head cheese, liver loaf, scrapple and bacon from the cheeks. The spices on hand in the laboratory were used by the cook to make the occasional chopped meat more palatable.

When tomatoes became plentiful and cheap, we put up a lot of them in our small canning plant, and made chili sauce and picallili. Several times a friend brought in a sack of clams, very small, about the size of a thumbnail. These would take a long time for the cook to prepare; we dumped them into a steam-jacketed kettle of water to open them, the scholastics removed the meat from the shells during their noon recreation, and we cooked them up for supper. Near the laboratory was a tree bearing a fruit much like a wild cherry. We made some of these into jelly, much like grape jelly, while others we fermented into an imitation cherry brandy. A very nice jam was made from papaya (a melon) with the addition of some kalamansis (much like limes); we called it Kalipaya Jam. Cacao, coffee and peanuts are native products of the Philippines and not too difficult to obtain. We roasted them in one of our open soap kettles. The cacao beans were then ground up, made into cocoa, or sometimes extracted with alcohol for Creme de Cacao. The peanuts were roasted and eaten whole or ground up into peanut butter, with sometimes cocohonee added. (Most internees became thoroughly acquainted with peanut butter during the occupation, realizing what a good protein substitute it was for the lack of meat). The canning factory was useful on several occasions when friendly Filipinos wished to take money to Mindanao; we sealed it in cans and it passed the Jap inspectors as food. Early in the occupation when good wheat flour was still obtainable, we bought 4 bags of Gold Medal and sealed it in No. 2 cans, for possible use later on in altar breads. Once or twice the Japs did bring in flour from China for religious use, and the Archbishop sent us samples for analysis; fortunately it was pure wheat flour. For altar wine I did ferment 50 lbs. of raisins, but I don't believe that was necessary as we obtained 8 large barrels of altar wine when the Army threw open the warehouses at the piers before the Japs entered Manila.

In the Fermentation Laboratory we had 12 to 16 large 12 gallon carboys constantly fermenting cheap sugar syrup, wash water from the coconut syrup, or fruit juices. One day a former student, Chinese, brought in 250 4-oz. jars of jam from mixed fruits; jars were old and dirty and labels spoiled, he merely wanted the containers back, since containers of all kinds rose rapidly in worth. We fermented the jam and distilled it into an excellent brandy, aged in charred oak casks, about 8 gals. altogether. A good supply of essential oils and extracts were on hand for making liqueurs, and these on feast days helped keep up the spirit of the community. Alcohol was made for medicinal pur-

poses, and later sold to several Filipino pharmacies when the price went up to about $20 per gallon. There was a market even for distilled water.

The Leather Laboratory continued to function as long as we could obtain cowhides and goatskins; these later were all taken by the Japanese forces at the slaughterhouses. But we had a large supply of sole leather on hand and also thin leather for repairing shoes. When shoe strings became scarce we slit the thin leather and made leather shoe strings. Black dye for leather we made into shoe blacking.

The Soap laboratory turned out some valuable products during the occupation. The drum of caustic soda we had on hand (600 lbs.) lasted about two years. Coconut oil, a product of the P. I., was easily obtainable in the beginning until it was declared a military commodity and trade in it forbidden. We had plenty on hand which we used for soap, and in place of altar candles when those gave out. We had never made much toilet soap during peace times, but now we went all out on production, and we were never short of it, nor of laundry soap, tho it was rationed by Fr. Minister Since no caustic soda is made in the Philippines, the price rose rapidly; after a year it cost $750 a drum (pre-war price about $20.), and a year later it was two or three times that. When we finished our caustic soda, we saved the ashes from the kitchen stoves and from the boiler room, leached them out with water, treated this with lime to make caustic potash. Then we made liquid soap, put it in former soft drink bottles, capped them with perforated caps. After playing around with formulas we came up with a very fine menthol shaving cream that gave a fine lather. Other products of the soap laboratory were tooth powder, skin creams for the women and children internees, hair shampoos, etc.

The Dairy Laboratory produced milk and ice cream, coconut milk, buttermilk with Acidophilus culture, and cheese. The latter was made from skim milk that was partly spoiled, or at least discolored, due to a leak in one 50-lb. can. I inoculated it with Camembert culture from the Microbiology laboratory, and after three months it turned into a fairly snappy cheese. The heat exchange unit, ordinarily used to cool the pasteurized milk quickly came in handy as a condenser for an extra still.

A ten H. P. boiler supplied steam for the steam-jacketed kettles in the Food Lab and for the large soap kettle; also to the steam engine for the shaft that ran through the building and turned the various machinery. When the kitchen ran out of fuel oil for the stoves, we gave it the balance of our stock, about 6 drums. What, now to use for fuel for the boiler? We solved this by saving all the leaves and twigs that fell from the many acacia trees on the grounds, piled them up, near the boiler, and by stoking these we had a head of steam, 60-75 lbs., almost as quickly as by using oil. Another problem was what to use for caps for the soft drink bottles? Although we had on hand about 800 gross of these, our consumption ran to about 5 or 6 thousand a

week. So we solved this by removing the cork lining from the used cap, hammering the cap flat in a die our mechanic had made, pasting the cork lining in again after sterilizing it, and the cap was almost as good as new. We used them four or five times over before they finally became worthless. (The price of caps went up to about .03 apiece, prewar they were about .03 a hundred).

THE JAPANESE TAKE OVER OUR MAIN BUILDING

In June 1943 Japanese officers with a couple of Jap civilians began to measure and look over the four older science buildings, directly behind the main building. These were all wooden one-story structures, built hurriedly after a fire wiped out the old Ateneo in the Walled City in 1932. Rumor had it that the Japs were going to take over the main building for a hospital, and intended making over the laboratory buildings into living quarters for us Jesuits. Despite our protests that these were not large enough to accommodate all of us, they started work on them. All the Physics and Biology apparatus was transferred to the large stage of the Auditorium, the body of which served as a church until its actual destruction in Feb. 1945. In five hours, with all the scholastics giving a hand, all apparatus and fixtures were taken out of the Chemistry building. This was quite a feat, as the building held 124 lockers all stocked with equipment, an office with four professors' desks and research table, a large stock room and a class room. Everything was removed including the pipes, the electric wires and fixtures, the side shelves, hood, and even toilet, and stored in one of the Technology buildings which were some distance away along the stone wall which separated our grounds from those of the Philippine General Hospital.

Finally on July 2 the Japanese gave us 48 hours to get out of the main building. Our many devoted alumni and friends, Sisters and girls from their schools, even an American internee at Santo Tomas Camp with a Jap army truck, came to help us move out. A good deal of furniture was carted to our church in the Walled City, much went to the good Spanish Augustinian Fathers, and to various convent schools. Contrary to the expectations of the Japanese an empty building was left to them, except for some furniture which in the last few hours they insisted they needed.

Now that the enemy were on our grounds it was doubtful whether we would be left long in possession of the rest of them. So with superiors' permission I started to sell some of the Chemistry equipment at prices that were 10 to 20 times the original cost. Since we had already been borrowing money to buy food, this added income was most welcome. The Japanese invasion money sank lower and lower in purchasing power, especially for articles formerly imported and not made in the Philippines. This was particularly true of chemicals and equipment. In 1944 a carboy of sulfuric acid C. P. was worth about $1,500, a gram of Methyl Orange cost $15, a pound of Bromine C. P. sold for

$400, a ten-pound can of Aniline sold for $1,400, a test tube cost $.50, and so on.

CHEMISTS AND CHEMICAL ENGINEERS IN DEMAND

Now if never before Filipinos saw the need of a native manufacturing industry. Laboratories for making various products sprung up all over Manila and it was to these Filipino chemists, not collaborating with the Japs, that we sold supplies. The former students of Industrial Technology started small factories in their home towns, and when they came to Manila they would tell me of their progress and express their appreciation for the training they had received in our school. But even former A. B. students would come around to borrow a book on Industrial Chemistry; they wanted to make a caustic soda plant! it was all described clearly in the book! "My dear boy," I would say, "the brains of the best chemical engineers in the country are now struggling with that problem." As a matter of fact, only one such very useful plant was built, and that by an Italian chemist who had come to the P. I. to set up a paper making plant just before the war. This electrolytic cell for caustic soda he built for Lissar, a Spanish owned soap factory. When asked by the Japs to build one for them, he refused and was interned with his family at Los Banos, where I met him frequently. Another much-to-be-desired product was sulfur dioxide for refrigeration. This project was tackled by a couple of engineers who came to me several times for advice. They were not chemists and didn't think they needed a chemist to help them; "they built the plant just like the diagram in the book." I tested for the presence of the gas at several parts of their setup where it should have been, but no sign of it. I referred them to a chemist who knew more about the process than I did, but "they didn't need him, they had followed directions in the book". They never did make any surfur dioxide.

Not once did Japanese officials come to the Technology laboratories, altho we had many things that would have been of value to them; they didn't seem even to know of their existence. One day I had a scare when two Jap privates came into the building where I was working in my shirt sleeves. They had escaped from the hospital and were now bringing rice bread back with them for their fellow patients. They looked around and examined different things, and after an hour, after saluting me, quietly left again.

THE AMERICAN JESUITS ARE INTERNED

On July 8, 1944 some Japanese officials came to the Ateneo at 5 o'clock in the evening and announced to all of us assembled that we would be interned the following morning at 9 o'clock. We were allowed to take with us bed and bedding and two suit cases of clothing, etc. The next morning our friends were present to see us off, much to the discomfiture of the Japanese, and we were carted off in closed

trucks to Santo Tomas Camp, where we spent the night on the concrete floor of the gymnasium. At 2:30 the next morning all of us, about 300 priests, Sisters, and Brothers, with about 200 Protestant ministers and their families were taken by truck to the railroad station, and then to Los Banos, about 35 miles south of Manila. There we were to live, or rather manage to hang on to life, until our liberation by parachutists and guerillas on Feb. 23, 1945.

In the meantime production of essential materials continued in the Technology laboratories by the loyal work boys under the supervision of a Filipino scholastic, Mr., now Fr. Guzman-Rivas, until October 1944 when the rest of our buildings and grounds were occupied by the Japanese, with the exception of the Auditorium which they respected as a church.

I cannot close this article without giving high tribute to the Scholastics, American and Filipino, who helped in the laboratory work from the beginning of the war until May when Theology classes were begun. Also words of praise are well merited by the Filipino laboratory workers and a few of the professors who helped out altho they ran the risk of displeasing the Japanese because of their apparent pro-American bias.

POSTSCRIPT

After release from internment camp I returned to Manila about March 7th. The next morning I visited the Ateneo and a sad sight met my eyes. The main four story building had been burnt out and the ruins were filled with debris, including seven dead Japs. The Auditorium and the four science buildings had all been destroyed by fire, and the library blasted by the artillery. Only the two Technology buildings still stood, not badly damaged by gun fire. But the equipment, what was remaining in the buildings, had been sieved by machine gun fire. A check-up during the next two weeks with the places where equipment had been evacuated showed that nothing was left of the former outfit of the Technology school, except the soft drink machinery, and the ice cream freezer.

When and if the College of Industrial Technology is to be reopened, lies in the hands of Superiors and Divine Providence. Certainly it proved its worth during the war years, and it was great fun working in the laboratories during those harrowing days, even though it meant a great deal of physical effort on the part of all concerned, and the solving of problems that would arise under scarcely any other circumstances.

ST. PETER'S PREPARATORY SCHOOL
CHEM CLUB CALENDAR

First Semester, 1947 - 1948

September

15—Organization Meeting
Plans for the Year

19—Business Meeting
The Chemist and His Work
Robert Heiart, '48

29—*Introduction to Mineralogy*
Rev. A. Hufnagel, S.J.,
Head, Dept. of Chemistry,
Brooklyn Prep School

October

3—Business Meeting
Movie - *The Chemistry of Combustion*
Project Lab

10—Tour - *R.C.A. Laboratories,*
Harrison, N. J.

17—Business Meeting
Election of Officers
Project Lab

20—Sound Movies -
Molecular Theory of Matter
Catalysis
Oxidation and Reduction

24—Business Meeting
Colloids and Their Uses
Frank Coyle, '48
Project Lab

31—Electrical Midgets
Lecture Bureau
N. J. Bell Telephone Co.

November

4—Exhibit Workshop

7—Business Meeting
The Chemistry of Gases
William Reynolds, '48
Project Lab

14—Sound Movies -
Scientists of Tomorrow
Making of a Tire
How Not to Run a Meeting

21—Project Lab

28—Tour - *Calco Chemical Co.,*
Boundbrook, N. J.

December

5—*A Collegian Looks at Chemistry*
Raymond Wilhelm, '45

6—Westinghouse Science
Talent Search Examination

8—Tour - *Hayden Planetarium*
Museum of Natural History

12—Business Meeting
Electro-Chemistry
Paul Tarantino, '48

19—Chem Club Christmas Party

January

22—Tour - *Colgate, Palmolive, Peet Company*
Jersey City, N. J.

The Chem Club Library and the Chem Lab are open every Tuesday and Friday from 2:45 until 4:15.

Physics

SCIENCE AT BAGHDAD COLLEGE

Rev. William D. Sheehan, S.J.

On September 26th, I had the pleasure of attending the graduation from M.I.T. of one of our Baghdad College boys. He is only one of about thirty Baghdad College boys in America, all taking Bachelor of Science courses in various universities including Boston College, Fordham, Detroit U. and Santa Clara. Ten or more graduates are studying science in England, while many more are in the Medical, Pharmacy and Engineering schools in Baghdad.

For various reasons, which I have not the space to enumerate, our school in Baghdad has become practically a pre-engineering and a pre-medical school. The course is really a five year high school course, three years intermediate and two years secondary. Together with a very thorough course in Arabic, English and Mathematics, our boys are forced to swallow big doses of physics, chemistry and biology. After elementary intermediate courses in these sciences, three lectures a week in each, they are ready for the advanced secondary courses, five lectures a week in each plus a laboratory period. With this background, it is easy to understand how one boy at M.I.T. averaged 88 for his first year, and how so many others have been so successful.

The scientific success of the school is due for the most part to the years of unselfish toil of Father Vincent Gookin, who for twelve years taught chemistry and biology at Baghdad College. He was the iron man, the Lou Gehrig, of the B.C. faculty, and in twelve years he never missed a single day of class. His students were always welcome at the Medical and Pharmacy schools. They not only knew their chemistry and biology, but they knew how to handle instruments. They handled a microscope well, and their biology drawing technique was such, that the medical school professors immediately put the Gookin-trained men

to work training the other students. Visitors to the school were always impressed with the laboratory, and with the biology, chemistry and physics lab. reports.

Father Guay, fresh from his doctorate work in chemistry at Clark University, arrived in Baghdad three years ago. So inspiring has he been, that many boys sacrifice their holidays to come and do extra chemistry experiments. Father Guay's scientific club has been a grand success. It has sponsored a series of excellent lectures by leading Baghdad scientists, including the director of industrial research, an M.I.T. man. Last year one section of the scientific society surveyed the school property; another group made daily records of their weather observations; while a third group kept track of sun-spot activity, using the eight-inch reflector telescope, which Father Guay recently reassembled and mounted on the school roof.

Unfortunately we have lost Father Gookin. Fairfield's gain is Baghdad's loss. Father Guay now handles all the chemistry, and Father Gerry, who just merited his master's degree at Fordham, will take care of biology. Mr. McGrath and Mr. Larkin are teaching physics this year, while Father Sheehan spends his sabbatical year taking courses in mechanics, acoustics and alternating currents at Boston College.

Through the kindness of the Rockefeller Foundation, an excellent physics and chemistry library has been donated to B.C. on the Tigris. Plans have been drawn for a new science building. Does anyone know anyone, who might donate enough money to get this building beyond the blue-print stage?

News Items

BOSTON COLLEGE CHEMISTRY DEPARTMENT

Dr. John R. Rouleau resigned from the Department and Fr. McGuinn, S.J., has been reappointed head of the department.

Three new teachers have joined the department: Samuel Glasstone, Ph.D., to teach physical chemistry; Andre de Bethune, Ph.D., to teach Analytical and Physical Chemistry; and Timothy McCarthy, Ph.D., to teach Analytical and Biochemistry.

Approximately ninety chemistry majors became A.C.S. Affiliates last Spring. During the summer formalities were completed for forming a Chapter of the same, and a first meeting of the group was held October 20th. A set of By-Laws was discussed and a Faculty Sponsor was elected. At the next meeting election of officers will take place, and the plan involves bi-monthly meetings during the school year. It is the largest chapter in this area.

Statistics on the department are as follows, approximately within 1%.

1250 students registered in chemistry courses.
17 graduate students registered for M. S. in Chemistry.
11 full time teachers in the department.
11 graduate assistants who are also graduate students.
6 seniors who assist in laboratory instruction.

A new laboratory has been installed for Physical Chemistry in a room on the second floor of the science building, and a partition offers laboratory and office facilities to the two professors of physical chemistry. This laboratory serves the elementary and advanced physical chemistry, the advanced analytical chemistry and the qualitative organic analysis. It is expected, also, that facilities for research in physical chemistry will be available. Four laboratory tables are equipped with the ordinary facilities of water supply, drainage, gas and electricity. The only extraordinary feature is that the tables make connection with these facilities that are installed along the wall rather than through floor or ceiling.

BOSTON COLLEGE PHYSICS DEPARTMENT

A new Alternating Current Laboratory was completed this September and is being used by the Senior B. S. in Physics. The new

Electronics Laboratory gives the Graduate Students some facilities for their research work. With over 700 students registered for courses in the department, these new laboratories were soon crowded. Of the 700 students in courses, 280 have registered for B. S. in Physics and 9 for M. S. in Physics. In the advanced courses of Optics and Thermodynamics, we have over 100 students and in the Applied Mechanics and Acoustics over 60 students.

The students in Radio Club have rebuilt the 20, 40 and 80 meter transmitter, and W-1PR now transmits and receives on these bands as well as the 10 meter phone. A new key system for code practise was also built, and some space was found for a course in the construction of radio receivers.

CANISIUS COLLEGE

MASTER OF SCIENCE THESES FOR 1947

Ralph J. Gall, B. S. (Canisius) *Thesis*: The Preparation of Ortho Esters of Titanium: I. Pentyl Titanate. II. 1-Ethyl Propyl Titanate.

Richard W. Greiner, B. S. (Virginia Polytechnic Institute) *Thesis*: The Preparation of Titanium Tetrachloride.

Richard J. Herdlein, B. S. (Canisius). *Thesis*: The Preparation of Ortho Esters of Titanium. V. 1-Methyl Propyl Titanite.

Eugene P. Kozoriz, B. S. (Canisius). *Thesis*: Radioactive Iron as a Tracer of the Solubility of Ferric Hydroxide.

Herbert J. Mellan, B. S. (Canisius). *Thesis*: The Preparation of Ortho Esters of Titanium. IV. Propyl Titanate.

Earl A. Munzert, B. S. (Canisius). *Thesiss* The Preparation of Ortho Esters of Titanium. III. 3-Methyl Butyl Titanate.

Stanley W. Rosowski, B. S. (Canisius). *Thesis*: The Separation and Determination of Cadmium and Zinc.

Alfred F. Schneid, B. S. (Fordham). *Thesis*: The Infra Red Spectrophotometric Determination of the Absolute Purity of o- and p-Chlorophenols.

Margaret M. Schreiber, B. A. (D'Youville). *Thesis*: The Preparation of Ortho Esters of Titanium. VII. 2-Ethyl Butyl Titanate.

Austin B. Short, B. S. (Canisius). *Thesis*: The Preparation of Ortho Esters of Titanium. VI. 2-Ethyl Hexyl Titanate.

Orvill E. Snider, B. S. (Oregon State College). *Thesis*: Cupric Chloride as a Catalyst in the Sandmeyer Reaction. I. The Preparation of 2-Nitro-4-Chlorotoluene.

FORDHAM UNIVERSITY

BIOLOGY DEPARTMENT

Over a thousand students from the various schools in the university have been enrolled in the courses offered by the department this semester. Seventy of these students are in the graduate school—fifty of whom are full time graduate students working for the Master's and Doctor's degrees.

Alterations have been made in the section of the basement that formerly contained the museum to provide more facilities for the college and graduate students in physiology. There are now two large laboratories for physiology next to the professors' office and private research room. One is being used for general and vertebrate physiology classes. The other is now equipped with special instruments and used as a research laboratory for doctorate students in physiology. More equipment was obtained this past summer to accommodate the large numbers that are taking physiology this year.

The activities of the Mendel Club have been resumed after a lapse during the war years. Mr. M. A. Fontanella, a new addition to the faculty has been appointed moderator. It is planned to conduct the club as a strictly biological organization.

Members of the faculty have been delivering popular lectures on biological subjects over Fordham's FM station since last August. A fifteen minute program every Wednesday is handled by the staff of the biology department.

Research is being conducted in animal and plant cytology, protozoology, helminthology, general physiology, entomology, plant physiology, and parasitology. Articles by various members of the staff and graduate students are appearing in current issues of zoological and botanical journals. Six papers will be delivered at the AAAS meetings in Chicago during the Christmas vacation.

Six students received the doctorate degree in June and are now teaching in Catholic colleges in Vermont, Washington, Indiana, and Minnesota. Two of these graduates are working as research associates in institutions in New York.

COLLEGE OF THE HOLY CROSS DEPARTMENT OF CHEMISTRY

The Rev. Joseph A. Martus, S.J., joined the staff of the chemistry department in September 1947 as Assistant Professor for Qualitative Analysis. He came to us from St. George's College, Kingston, Jamaica, B.W.I. Accordingly there are now seven on the staff: two Jesuits and five lay professors. Mr. Charles F. Turner, S.J., came to us from Weston College as a full-time student of chemistry. Student enrollment as of September 1947 is somewhat higher than last year, tallying 418 men who take instruction in the department. Of these, 87 are candidates for the B. S. degree in chemistry; most of the others are pre-medical students.

The Sugar Research Foundation has generously continued and extended grants to Doctors Baril and VanHook. Dr. Baril will work on the rates of the reduction of sugar. Dr. VanHook will continue sugar crystallization studies. The latter has been invited, and expects to address three of the southern sections of the American Chemical Society about the end of January 1948 on the topic of sugar crystallization. His recent publications include: Chemical studies of beet pectin (with E. Roboz) in Proc. 4th Gen. Meeting, 1946, Am. Soc. Sug. Beet Technol., pp. 574-583; Atopical solid-liquid transitions. Biodynamica, 6, 81-92 (1947) and a Review of the liquid state, 1936-1945 in Relationes temp. bell. Pontif. Acad. Sci., no. 6, (1946).

The newly-formed Central Massachusetts Section of the American Chemical Society elected Dr. VanHook, secretary; Dr. Baril treasurer, and Fr. Fiekers, S.J., councillor.

In June, the Master of Science degree in chemistry was conferred on the first eight of our post-war candidates.

Fr. Fiekers attended the inauguration of President Eugene Sullivan, H. C. '26, at Worcester State Teachers College, early in May, 1947. About mid-October he represented the College at the Centennial Celebration of the Sheffield Scientific School of Yale University.

The department was cited as follows in a paper read by Dean Bernice Cronkhite of Radcliffe College, at the Annual Meeting of the New England Conference on Graduate Studies, held at Smith College early in May: "In general our New England Colleges tend to offer graduate work only in those fields in which the Institution is well equipped to provide instruction of graduate grade: Holy Cross, for example, gives a master's degree only Chemistry, Tufts the Ph.D. only in International Law and Diplomacy . . . ". Indeed, many of the delegates to the meeting deemed it a wise policy for a college to concentrate its effort mostly in undergraduate work.