vol V

A. M. D. G.

BULLETIN

of the

AMERICAN ASSOCIATION OF JESUIT SCIENTISTS

(Eastern Section)

(For Private Circulation)

Vol. V., No. 1, Weston, Mass. September-October, 1927, p.1.

CONTENTS

SIXTH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF JESUIT SCIENTISTS
(Eastern States Division)

The sixth annual meeting of the American Association of Jesuit Scientists (Eastern States Division) was held at Holy Cross College, Worcester, Mass., August 12 and 13, 1927. The first general meeting was held in the spacious amphitheatre of the Chemistry Department. It was presided over by Fr. George Strohaver, the President of the Association. Rev. Joseph N. Dinand, S.J., President of Holy Cross College, extended a warm welcome to the members of the association, in an address of encouragement and appreciation of the work done by the Association.

The president appointed the following committees:- Committee on Nominations, Frs. Coyle, Shaffrey and Gipprich; Committee on Resolutions, Frs. Phillips and Mahoney and Mr. Bihler.

The President, Fr. Strohaver, read the Presidential Address, On "Cooperative Research" in which he outlined the way in which this research is carried on at Holy Cross and other places.

Meetings of the separate sections were held on the afternoon of the 12th. and morning of the 13th., with meetings of the Mathematics and Physics sections at different hours, to enable members of both sections to attend the meetings of both sections.

The final general session was held on the morning of Saturday, August 13. After the treasurer's report had been read and accepted, the results af the elections in the several sections were announced as follows:-

Biology: Chairman, Rev. John A. Frisch
Secretary, Mr. George J. Kirchgessner

Chemistry: Chairman, Rev. Richard B. Schmitt
Secretary, Mr. Edmund J. Wolff

Mathematics: Chairman, Rev. Edward C. Phillips
Secretary, Mr. Thomas D. Barry

Physics: Chairman, Rev. John A. Tobin
Secretary, Mr. John W. Tynan

Father Coyle as Chairman of the Committee on Nominations, announced the Nomination of Father Phillips for President and Mr. Barry for Secretary. A motion was made, seconded and carried that the nominations be closed.

Father Phillips as Chairman of the Committee on Resolutions read resolutions extending the gratitude of the Association to the superiors of Holy Cross College for the welcome given them, and to Fathers Brock and Mahoney and their assistants for the excellent work in behalf of the bulletin. Father Coyle offered a third resolution thanking the retiring President for his labors on behalf of the Association.

After discussion, a resolution was passed dividing the Bulletin into six sections, viz., Editorial, News, Biology, Chemistry, Mathematics and Physics, and making the sectional sub-editors responsible for the collection and preparation of the matter of their respective sections.

The advisability of having the Bulletin printed instead of mimeographed was debated at length, but on account of the cost involved in printing, no change was made from the present custom of having it mimeographed.

Mr. Quigley's offer to superintend the mimeographing of the Bulletin during the coming year was accepted by the Executive Committee.

Thomas D. Barry, S.J.
Georgetown University,
Secretary.

THE BULLETIN

Much of the discussion at the closing session of the Holy Cross Meeting of the Association was devoted to the Bulletin. It seemed to be quite generally admitted that, while it has not failed in its main purpose, it could nevertheless be improved by a larger number and a greater variety of articles. It is clear that the review finds its only reason for existence in the benefits which it may bring to the teacher of science and mathematics in our Colleges and High Schools. They are the subscribers To them it must look for support. This support luckily is not financial but takes merely the form of an occasional article or note. It is true that our teachers are busy men and hence do not find much time to look up material and prepare articles. Others who find opportunity may feel that what they have on hand must needs be known to everybody and so do not think it worth while to send it in. Others again may prefer a larger review with a bigger circulation in which to publish their work. These reasons for not contributing cannot be gainsaid. We may state however that we are all glad to see articles by Ours in the larger scientific journals. They are evidence of active scholarship and are an inspiration to every Jesuit teacher and student of science. But the fact that an article appears first in the Bulletin is no reason why it should not be published elsewhere. The Bulletin claims no copyright and is glad to see its material printed so as to give it a wider circulation. Even though a article appears in some scientific review, an abstact will be welcome as many of our readers may not have opportunity to get hold of the printed publication. If one thinks that his article will have nothing new in it and hence will not be acceptable he should remember that all of us are anxious to learn and that not a few are just beginning or are in their first years in the classroom. These latter especially are looking for helps and hints which may seem commonplace to old timers. As for lack of time, due to pressure of class work if each member of the Association or even only half of the members could find time for even one article or note the editorial office would have a very gratifying reserve on hand and the Bulletin could be improved. Let each copy of the Bulletin, as it comes be a reminder of at least that one article.

PREPARATION OF EMBRYOLOGICAL MATERIAL

A. Chick Embryos.

1. Incubate the eggs at 37.5° C. for at least six hours longer than the age desired.
2. Open the egg by breaking the shell at the large end so that the air-space is reached without breaking the egg-membrane. Then carefully pick away the shell until a little more than half remains. Be careful not to have any sharp points left which could puncture the yolk as the contents of the shell is poured into the salt solution. The white of the egg will flow out but care must be taken that it does not pull the yolk with it or break the yolk membrane, for it is most important that this should not happen especially with the very young embryos. Should it happen there may be a chance of finding the embryo by pouring the broken yolk into the salt solution and carefully separating the membrane from the yolk. With the older embryos it is not so difficult to find the embro even if the yolk does break, and in fact in handling the 72 hr. and the 96 hr. embryos it is very hard to prevent the breaking of the yolk membrane but the embryo is so large that it can be easily lifted from the salt solution by grasping the membrane tightly with corrugated forceps floating the embryo into the salt solution.

3. Place the yolk and whatever albumen remains, in the salt solution which should be 0.75% NaCl heated to about 38° C. In doing this place the egg, shell and all in the salt solution and then with-draw the shell from under the yolk.

Sometimes the membrane containing the embryo will adhere to the shell, especially with the older embryos, when the yolk breaks, so it is well to examine the inside of the shell before throwing it away.

4. Removing the embryo from the egg. Using a camel's-hair brush, float the yolk until the blastoderm is up. Steadying the egg with the brush or with a forceps which is probably better, cut through the membrane and well outside the blastoderm if it is small, encircling the blastoderm with the cut until it is free from the yolk. When the first cut is made and the yolk begins to flow it is well to grasp the edge of the blastoderm with the forceps and draw it into a position in which the circular cut may be completed.
Having freed the blastoderm transfer it to salt solution in a Syracuse watch-glass. This may be done in two ways. One is by sinking the edge of the watch-glass in the salt solution containing the egg. This dish should be a glass dish such as a desert dish, or a large evaporating dish could be used. By slowly floating the blastoderm over the watch-glass and gradually withdrawing the watch-glass from the solution being careful at the same time that the water flowing from the watch-glass does not draw the embryo with it, this part of the technique can be easily accomplished. A second way is to grasp the edge of the blastoderm well with the forceps and lift the embryo into the watch-glass held just above the solution. This method is more apt to distort the embryo than the first one but it gives good results most of the time.

5. Removing the vitelline membrane. This is a task at times which gives considerable trouble, especially with the small embryos. Very often with the large embryos the vitelline membrane is washed off before the embryo has been transferred to the Syracuse watch-glass. The difficulty which first presents itself is to determine on which side of the blastoderm the membrane is to be found. By having the watch-glass well filled with salt solution it will be easy to float the blastoderm back and forth after having taken hold of it out on the

edge and well away from the embryo. By very slightly jerking the blastoderm it may be possible to loosen enough of the vitelline membrane to detect its presence, and then by floating the blastoderm back and forth rather rapidly the membrane will be finally washed off. Should the membrane not come loose, then holding the blastoderm with the forceps try to push the edge of the membrane loose with the tip of the camel's-hair brush, keeping far enough away from the embryo to do no harm. Once the vitelline membrane has been removed grasp it with the forceps and lift it from the watch-glass.
The blastoderm by this time may be rolled up but it must be flattened out.It is not well to touch it with any instrument as it is so tender that it will be torn and is so sticky that it will adhere to the instrument and be damaged in removal from it. The best way to flatten it out is to draw some of the solution from the watch-glass in a medicine dropper and drop it from a height of one or two inches over the blastoderm which will float and partially unroll. When one edge has flattened on the bottom of the dish, by means of the dropper direct more solution against the rolled portion until it has been flattened out. Then by means of the dropper remove the salt solution from the watch-glass after having loosened all yolk particles from the bottom of it. In removing the solution keep far away from the blastoderm and have the end of the dropper directed away from the blastoderm, in fact against the edge of the watch-glass for the blastoderm is very easily drawn into the dropper and ruined. The technique thus far is best mastered by having an experienced hand direct you. Do not be discouraged by failures and by embryos destroyed. All who are familiar with the technique have become skilled by the same experience.

6. Allow the embryo to remain in the watch-glass for a few minutes after the solution has been removed but do not allow it to dry.

By remaining for a minute or two it will slightly adhere to the dish and after the killing and hardening will remain a flat disc easy to handle.

7. Killing the embryo and fixing it. With a dropper very carefully cover the embryo with a solution of sublimate-acetic. The solution should be allowed to fall a drop at a time until the embryo is well covered. It is not well to put much solution on the embryo as the blastoderm may float up and then curl up and give trouble from the first step to the end.
The sublimate-acetic solution is a 5% glacial acetic acid in a saturated solution of corrosive sublimate.
Allow the embryo thus covered to stand for an hour in the case of small embryos and two hours in the case of the older ones.

8. After an hour remove the sublimate-acetic. This is best done by taking the watch-glass in the fingers of the left hand and holding the edge of the blastoderm far from the embryo with the camel's-hair brush, and pouring the contents off into a waste jar or basin.
Froma 16 ounce bottle pour distilled water into the dish without allowing the flow to directly strike the embryo. Should the embryo float remove all adhering particles of albumen from the watch-glass with the brush. Should it not float, carefully push the ends of the bristles against the blastoderm being patient enough to allow very slight touches to loosen it. Pour off the water and again fill the watch-glass with distilled water and allow it to stand for an hour.

9. Dehydrating. Place in 35% alcohol for an hour, then 50% alcohol for an hour, keeping the embryo in the same watch-glass so as not to handle it any more than is absolutely necessary. Then place in 70% alcohol to which enough iodine has been added to give a light red color. The iodine will remove the mercury which may remain in the embryo. Leave in this solution for 6 hrs. If the iodine color entirely disappears in that time fresh iodine-alcohol must be used and the embryo allowed to stand for several hours more. The embryos can remain in this alcohol over night without receiving any injury.
They should not be left in a weaker alcohol than this over night. After the iodine-alcohol, cover with clear 70% alcohol for 3 or 4 hours. Then place in 80% alcohol for preservation until time for staining.

10. Staining Chick Embryos.

A. For Total Mounts.
Transfer to Conklin's Haematoxln which is Delafield's Haematoxyln diluted with four times its volume of water and treated as follows. To each 6 c.c. of the above solution one drop of Kleinenberg's undiluted picrosulphuric acid is added This solution of picrosulphuric acid is a 2% sulphuric acid in a saturated solution of picric acid. Allow the embryos to remain in Conklin's haematoxyln from one to three hours. No harm is done by over- staining because they will be destained later in acid alcohol. Allow the embryos to remain long enough to be stained almost black.
Remove the stain and wash in distilled water and pass up through the alcohols to 70 % alcohol. Extract the superfluous stain in acid alcohol, (1% HCl in 70% alcohol) leaving it for about 6 hours if necessary. When the embryo has a very light brown color it has lost enough of stain. This may happen in an hour with the small embryos. Then wash in several changes of 70% alcohol.
Place in 80% alcohol for 1 hr, then 95% alcohol, then in pure chloroform for 1 hour.
Mounting. By means of a section lifter and a camel's-hair brush transfer the embryo to a slide.

By means of a pipette drop xylol on the embryo until all of the chloroform has been washed away. Place small pieces of broken coverglass around the embryo and mount in balsam, being careful to be quick enough not to allow the embryo to dry out.

B. For Sectioning.

Run the embryo down through the alcohols to 50%. From this strenght place it in borax carmine. This stain is made by adding 8 gms. of borax and 2 gms. of carmine to 150 c.c. of distilled water. Allow the embryo to remain in this stain for at least 12 hrs. Pour off the carmine and wash in distilled water. Place in 50% alcohol for an hour, then in acid alcohol for six hours. (For acid alcohol see above). Wash in several changes of 70% alcohol to be sure of taking out all acid.

Place in 80% alcohol for an hour. Transfer to 95% alcohol for an hour, then to a 50-50 mixture of chloroform and 95% alcohol for an hour, then to pure chloroform for an hour, then to a semisaturated solution of paraffin in chloroform for 1 hour, then to a saturated solution of paraffin in chloroform for 1 hr. Place in melted paraffin, 47° paraffin in winter, 52° paraffin in summer, for about an hour. The oven should be at about 56° C. Change to fresh paraffin in the oven for an hour.

Imbed in a Petri dish by slightly greasing the dish with glycerine being careful to have no droplets present. Put the Petri dish on a warm copper plate, transfer the embryo to the dish by means of a section lifter, then pour in pure paraffin which is fresh and contains no chloroform. Do not imbed from the first paraffin for you are sure to have bubbles of chloroform adhere to the embryo and give trouble. Should there be any adhering when the embryo has been placed in the Petri dish, break the bubble by touching it with the point of a hot teasing needle.

In imbedding the embryos in which torsion is partially or entirely complete, place the embryo in the Petri dish so that it is lying on its right side. The reason for this is that when you come to mount the embryo on the microtome you must mount it in such a way as to have the cephalic end toward the knife and the convex curvature toward you as you face the wheel of the microtome. When mounted on its right side the embryo is plainly visible when you come to put it on the microtome, for you turn the block over to get this position and there is very little paraffin covering the embryo as it was resting on the bottom of the Petri dish. When you cut such an embryo the sections are mounted in their order just as they come from the microtome and when they are viewed with the microscope the neural tube will be distal to you and hence will have the position which the embryo had on egg, i.e. ventral side below, and the section as you look at it will have the position seen in all illustrations in the textbooks. In the young embryos in which torsion has not taken place, if it were possible to determine which is the ventral side, you should place the embryo in the dish with the dorsal side downward, but this is practically impossible, so mount the embryo flat in the dish regardless of which side is up. In cutting all embryos of whatever age you should mount them on the microtome with the dorsal side toward you if it is possible to determine which is the dorsal side. The embryos which have undergone no torsion should be mounted so that the embryo is seen on the side of the block toward you, i.e. it should not be on the upper surface of the block, nor on the side away from you but toward you. When the embryo has been cut determine by means of a lens the position of the neural tube and if it is toward you, i.e. in the lower part of the section mount it as it has come from the microtome,and as the microscope will reverse the section the neural tube will be at the distal part of the section, which is where you want it. If it lies in the distal part of the section when you view it with the hand lens, turn the ribbon over from end to end, and then mount it.

Some embryos are so small that it is difficult to determine which is the cephalic and which the caudal end. In this case cut the embryo regardless of which is the cephalic end and then with the hand lens determine by examining the sections and then if necessary turn the ribbon from end to end, and examine it for the position of the neural tube in the sections, and turn it over if necessary.

In mounting the 48 hr., 72 hr. and 96 hr. chicks and the 10 mm. pig, if they have been cut properly mount the sections with the glistening side of the paraffin ribbon next to the slide. Remembering this point will make it possible to properly mount sections of the ribbon which may have been turned over in the technique or by the breeze.

To avoid such a difficulty be careful not to breathe heavily over the ribbon and do not attempt to mount with a draft blowing over the table. If the above directions are not entirely clear they will become so after you have made a few mistakes and spoiled a few series.

B. Pig Embryos.

Secure 10 mm. pig embryos free from the amnion if possible. If they come with the amnion carefully remove it. This is tedious work and easily results in damage to the embryo. To remove the amnion slit it over the back with a fine pointed scissors for the entire length, then brush it off of the embryo and cut the cord with the fine scissors as far from the embryo as possible.

The embryos usually come in 80% alcohol. Place the embryo in water until it sinks. Then place in a solution of alum cochineal for 24 hours or longer.

Alum Cochineal.		
	Powdered cochineal	6 gms.
	Potassic alum	6 "
	Distilled Water	80 c.c.

Boil vigorously for 20 min. and allow to settle. Decant the clear fluid; add more water and boil again. Decant and add to first solution, filter and evaporate down to 80 c.c. Add a small piece of camphor to prevent molding.

Transfer to water for an hour or longer to extract the alum. Remove from the water if too much stain is being removed. This is not so apt to happen. Place in 50% alcohol for 1 hr., then 70% alcohol for an hour and then in 80% alcohol for 12 hrs., 95% alc. for 12 hrs., abs. alc. for 12 hrs. then chloroform for 12 hrs., then somisaturated chloroform and paraffin, 12 hrs., then saturated chloroform and paraffin for 12 hrs., then in melted paraffin for 6 to 8 hrs. at 58° to 60° C. Imbed in 52° C. paraffin in a Petri dish, with the embryo lying on his right side. Cut in sections 15 to 20 microns thick.

Rev. C.E.Shaffrey, S.J.
St. Joseph's College
Philadelphia.

THE ALMEIDA STORAGE BATTERY.

During the last few months various Catholic Reviews such as America, Studies, The Month, The Tablet etc. have made reference to a new storage battery invented by Fr. Almeida a member of one of our Spanish Provinces. "Studies" our Irish Review tells us that he was born in 1893 in Salamanca and entered the Society in 1908. He taught Physics in the Colleges of Vigo and Valladolid and in 1920 he went to Valkenburg to continue his studies.

He conceived the idea of the new battery in 1921 and discussed it with Fr. Wulf there. Father M. Downey of Woodstock has kindly sent us the following extract which he translated from an article of Fr. Puig.

(Extract from an article published in the Argentine magazine "ESTUDIOS" by Ignacio Puig, S.J., assistant director of the Observatorio Astronomico, Ebro, Spain.)

The daily press during the past few months has giving space on several occasions to a new type of storage-battery, the invention of a Spanish priest, Edmundo Almeida, of the Society of Jesus. But details of the construction and operation of this battery had not been made public until the lectures given by the inventor at Cadiz, Seville and San Sebastian during the month of May 1927. We shall sum up here the two lectures given at Cadiz and Seville, at which we had the pleasure of being present.

Accumulators, hitherto, as is well known, have been either of the acid type, for example the Tudor battery, or the alkaline type, as the Juttner battery which was perfected by the famous Edison. Everyone recognizes in these batteries several grave inconveniences which greatly limit their use not the least of which is their scanty capacity with relation to size and weight.

Attempts to improve upon batteries have been made ever since the day when Plante first visioned them in 1858. The experiments alone of Dr. Lange at the "Acumulatoren Fabrik" cost 30 million gold marks, without positive results; and the experiments undertaken in Germany at the expence of the Prussian Railways, costing 2½ million gold marks, were likewise without notable results by reason of the inability to increase battery capacity by more than a few decimals.

This was precisely the reef which threatened Father Almeida with shipwreck. When working in Madrid the difficulty was urged against him: "How will it be possible to attain this golden dream of inventors here in Spain with most limited means and without the study and technique of foreigners?" But these difficulties did not daunt our inventor; they only served the contrary of stimulating him to continue ahead on the road which he had started.

I.- CHARACTERISTICS OF THE NEW BATTERY.

The Almeida battery belongs to the class termed neutral batteries. The negative plate is composed of zinc amalgam, deposited in crystalline form upon a suitable nucleus; while the positive plate is composed of an unchangeable conductor, graphite, with finely divided silver, which acts upon the whole as a catalytic agent. The electrolyte consists of a water solution of chloride of zinc ($ZnBr_2$) mixed with other halogen salts of the same metals, having rather small heat of formation e.g., bromide of zinc ($ZnBr_2$).

The process of charging the Almeida battery comprises three phases: 1) Electrolysis of $ZnBr_2$ with the deposit of zinc on the negative plate and formation of AgBr on the positive plate, up until the disappearance of all the silver in a free state. 2) Continuation of the electrolysis of $ZnBr_2$, when the bromine, freed on the positive plate, due to the lack of free silver, comes to form in the AgBr a solid solution or occlusion: this phase proceeds until the exhaustion of the $ZnBr_2$ contained in the bath. 3) Electrolysis of $ZnCl_2$ with the deposit likewise of zinc on the negative plate and formation of AgCl on the positive plate, because of the chlorine displacing the bromine in the $ZnBr_2$; when all the bromine has been displaced from the bromide, the chlorine in excess combines with the bromine of the solid solution forming chloride of bromine (Br_2Cl_2).

In the beginning he met with serious difficulty in increasing the capacity of his battery, principally because of the negative plate; for the zinc of the electrolyte would not remain fixed so as to adhere to the zinc plate of the cathode.

After many attempts he managed to overcome this difficulty, obtaining a deposit of zinc perfectly adhering, so that on this account the capacity of the Almeida battery will be unlimited so long as there be salt of zinc in the bath and sufficient space on the cathode to deposit the metal; the limitation, of course, of the capacity comes from the positive plate.

During discharge the process is the same as for charging, but in the inverse order. In the first phase of discharge, the third of the charging, the chlorine returns to the bath to regenerate the chloride of zinc, and the E.M.F. is 2.50 volts. In the second phase the occluded bromine passes to the bath in the form of bromide of zinc, the E.M.F. being then 1.94 volts; lastly, in the third phase, the first of the charging, there remains again free silver and the bromine of the bromide of silver passes likewise to the bath, being changed at the same time into bromide of zinc, and now the voltage is only .94. This third phase it is not necessary to utilize, except in case of necessity; both because of the small quantity of energy which it supposes and the weak potential which it gives. It must be noted that the Almeida battery is perfectly reversible, and by reason of the special arrangement of the positive plate, during short circuit there is caused in it an electric couple of one volt, which produces the effect of a real suction over the halogen elements of the electrolyte and completely prevents spontanecus discharge.

The advantages of this battery are immense; they can be reduced to six.

1) It permits the storage of ten times more electric energy than any other battery its equal in weight, and with good foundation its inventor hopes to double this capacity, so that then its capacity will surpass by twenty times that of any other battery.

2) Unlike other batteries no long period of preparation is needed, such as a series of charges and discharges. In the course of the experiments made in Paris at the beginning of the year, this was one of the features of the battery which most gained attention. For example, when the factory had immediately turned out a battery at six in the evening, Father Almeida would prepare and pour in the solution; during the night the battery would be charged and in the morning following it would function perfectly to the great admiration of all present.

3) The battery may be charged without injury with intensities of current 20 times greater than any other battery will permit. It can also be discharged rapidly in short circuit, without any ill effect, for in this battery polarization does not exist. Moreover the positive plate cannot undergo any deformation in its electrodes, because it diminishes in volume during the discharge of the battery.

4) The battery can remain indefinitely charged without the least loss of energy and likewise indefinitely discharged without any danger of sulfation.

5) It offers a yield of 93%, whereas batteries of the alkaline type give only 50% and those of the acid type 72%. This return was tested by Professor Donald in the laboratory of Berlin, with this peculiarity, that the battery was managed by one of the workmen.

6) Another advantage, although certainly only a secondary one, is the fact that the making of these batteries in not poisonous, whereas the construction of other types of batteries has, in cases, caused the workmen lead poisoning, a disease for which as yet there has not been found an efficacious remedy. Moreover the very bath of the Almeida battery is non-corrosive, as with the acid type; so that the hand might be dipped into the liquid without the least ill effect. Its ingestion is certainly poisonous, and if some evolution of gas could take place, which certainly does not occur, by its disinfectant characteristic it would be indeed very beneficial for the health.

One of the principal secrets of the success of this battery is due undoubtedly to the special composition of the positive plate, which, being formed of both an unattackable body (graphite), and an attackable (silver), gives rise within itself to a local electric couple of approximately one volt; and this difference of potential prevents it from remaining either in repose or in equilibrium up to the saturation of the silver by the bromine or the chlorine; and thus the sponge of silver has really a

suction effect upon the halogen -lements of the electrolyte, there being produced a dilution in concentration about the positive plate.

Father Almeida has managed, moreover, that this same positive plate exhibits a velocity of absorption or occlusion that is very great, due to its structure which causes the manner of charging to be totally different from that of ordinary batteries, without the well known danger of bubbling, so that there is not even to be noted the coloration which might be expected of either bromine or chlorine.

Another of the secrets of the good results of the Almeida battery is the happy selection of salts that are used, for these had to be such as to give compounds insoluble with silver; otherwise the substances formed at the expence of the positive plate would enter to form part of the bath and thus the battery would have no effect, as in the end the attackable part of the anode would have completely disappeared.

Father Almeida signed a contract with a company which has taken the title "Compania Internacional de Acumuladores Almeida". This contract includes all countries except Spain, for which other arrangements will be made, the constitution of another company being formed for Spain under the name "Compania Nacional de Acumuladores Almeida". The concession for France has been given to the house of "Schneider & Company".

Afterwards, the directors of the "Compania Internacional" wished that the invention be submitted to a final test by a Mr. Joffries, one of the foremost battery specialists of England. He performed the experiments himself and at the completion of the same striking the table he exclaimed, "Never did I think that this system, for me but a dream, would come to be a reality". He then added, "We are on the eve of a revolution".

Scarcely was the aforementioned contract concluded when the "Compania Internacional" thought to mount the batteries on an automobile for the sake of advertisement and send it on a tour of the continent; but this idea had to be given up for fear of the great alarm such a step would cause the business world. Thousands of letters have been received by the company asking for information, data and batteries, but it has been impossible to satisfy these requests, for the contract for the construction of the first factories was signed only last March and as yet manufacture on a large scale must wait until the factories are finished. Soon there will be several factories in Paris, one in London and others will be started as soon as possible in the United States.

Ignacio Puig S.J.
Sub-Director of the Astronomical
Observatory of Ebro, Spain.

Note; We have not noticed many references to this remarkable battery in the various scientific journals. A search through the technical journals especially those concerned with electrochemistry and Electrical Engineering would doubtless reveal a number. Mr. F.Power has called our attention to two references, (for which he is indebted to Mr. Julian A. Sohon, Bibliographer, Engineering Society Library, New York) viz. Elektrotechnische Zeitschrift for June 30, 1927 and the Revue Générale De L'Électricite for Sept. 3, 1927. The Revue Générale De L'Électricite quotes some of the Spanish papers concerning the battery and then translates a note which appears in the latter. This note gives a brief description of the battery and says that it if reported that the tests made at the factories of the Accumalatoren-Fabrik A.G. at Hagen and also at Berlin had given very satisfactory results. The Elektrotechnische Zeitschrift states that it addressed itself to this company for further information and received the reply that it had tested the battery carefully for a period of six months and that further tests had been abandoned. The reasons given were that it had not come up to expectations in capacity for a given weight, efficiency and life. It even claimed that the energy and efficiency are less than those of the lead and alkaline batteries.

It stated further that Chlorine and bromine are evolved when the battery is charged and that it does not seem possible to avoid this in any practical way. This is simply the statement of a single company in Germany which manufactures storage batteries. Its report has not the authority of an institution like the U.S. Bureau of Standards. It is not easy however to understand it in the light of what has been published elsewhere and especially in view of the fact that companies have been formed in Europe to manufacture the battery which is expected to be on the market early next year. We shall be glad to have further information on the subject if any of our readers can supply it.

As we go to press, a Boston paper, quoting an Associated Press despatch from Paris, states that Jean Cabrerets, a French technical writer, says that the new battery-"areal revolution in science"-has proved its worth; and the right to make it has been acquired by French, English and German firms whose names are kept secret. He further says that an automobile will run 600 miles on a charge that can be put into it in an hour.

UNITED STATES GOVERNMENT PAYS TRIBUTE TO OUR SEISMOLOGISTS.

The UNITED STATES COAST and GEODETIC SURVEY recently issued Special Publication No. 132 entitled "Progress of Seismological Investigations in the United States" January 1, 1925 to June 30, 1927, By N.H.Heck Chief Division of Terrestrial Magnetism and Seismology. It comprises the official report made to the Section of Seismology of the International Geodetic and Geophysical Union, International Research Council. Mr. Heck states that in 1925 seismological investigation by the Government was transferred from the Weather Bureau to the U.S.Coast and Geodetic Survey. However in taking up the work the Survey realized that it was neither practicable nor desirable for the Government to undertake a very large part of the great amount of work to be accomplished. Accordingly the Survey has made special efforts to establish cooperation with other organizations. He then says, "Avaluable contribution to seismology in the United States is that of the Jesuit Seismological Association organized in 1925 under the direction of Rev. James B. Macelwane, S.J., head of the department of geophysics, St. Louis University, St. Louis, Mo. The Association's work includes the coordination of the work of 11 stations with a definite program of improvement of instruments and methods and interpretation of results". In speaking of general progress he says, "The study of wave transmission is being prosecuted actively. The work of Macelwane is outstanding; and Byerly (of the University of California) and Neumann (of the Coast and Geodetic Survey) are giving considerable attention to this subject". In Part II, which contains the Summary of earthquake investigation in the United States, nearly a third of the space is devoted to the Jesuit Seismological Association. A brief history is given referring especially to the pioneer work of Frs. Odenbach and Tondorf. Mention is also made of our present stations with some of their equipment. Mr. Heck also says. "The Association has arranged a program of cooperation whereby the data of important earthquakes are telegraphed to the United States Coast and Geodetic Survey from selected Jesuit Stations and relayed, together with the data from the Government and other stations, to the central station in St. Louis; some of the reports being telegraphed direct to St. Louis. The central station has made determinations of epicenters and issued preliminary bulletins by mail, giving the tentative location of the epicenter and an interpretation of the reports of the stations in each case a few hours after the earthquake. These preliminary bulletins are sent to about 170 stations and individuals throughout the world". This appreciation of our work in seismology from the oldest and one of the most important scientific departments of the United States Government is indeed gratifying. It shows the importance of the work undertaken by the Association. It is to be hoped that additional stations will be established in other parts of the country at our colleges and that the association will become not only national but also international.

PUBLICATIONS.

We are indebted to Fr. Phillips of Georgetown for the following interesting references;

Die Himmelswelt, (published in Berlin) in its June, 1927, issue has on page 176, a picture of Fr. Hagen with a brief note under the caption: "Der Nestor der Europaischen Sternwartenleiter", "The Nestor of the European Observatory Directors".

The Catholic World (New York) has in its issue for August 30, 1927, an articoncerning the life and works of Father P. Lejay who recently visited us on his way from Shanghai, were he superintended the World Longitude Operations, to Paris. After finishing his studies and his Terianship he is to return to Shanghai as Director of the Observatory.

There has just been distributed to the Observatories of the world Vol. XVI of the Annales de L'Observatoire Astronomique de Zo-Se, entitled "Cooperation de L'Observatoire de Zi-Ka-Wei a la Revision international des Longitude", which details the longitude work just mentioned above. It is a quarto volumes of 156 pages, and is, as far as Iknow, the first extend report issued by any of the participating observatories. It shows the energy and efficiency of our Jesuit Confreres in the China Mission.

The Astronomische Nachrichten, No. 5507 contains an article announcing the results of measurements of the proper motion of 79 equatorial stars contributed by Father L. Gauchet, S.J., Director of the Zo-Se Observatory.

The Science Service News Letter for September 3, 1927 publishes a photograph and short biographical article on Father F. Tondorf. Among other things it states that "There is perhaps no seismologist in America better known than Father Tondorf. The first reports of an earthquake anywhere invariably mention his reading of its story on his instruments at Georgetown University. It hardly seems like a fully authenticated quake until the seal of his pet Galitzin seismograph has been placed on it. It is frequently stated, and so far never disputed, that he has the best equipped station of its kind in America; and in addition to his indefatigable personal work in his own cave Father Tondorf has taken an active part in the organization of the Jesuit Seismological Association, which makes available to the scientific world the results of the coordinated readings of dozens of instruments in universities and colleges scattered over the United States".

In the Bulletin of the National Research Council, July 1927, are published the transactions of the eighth annual meeting of the American Geophysical Union. The list of membership shows that out of the 72 scientists constituting the Union two are Jesuits; Father Macelwane, of St. Louis University and Father Tondorf of Georgetown University. The transactions contain Father Macelwane's "Report of Progress in Seismological Work" as official spokesman for the Jesuit Seismological Association, and his paper on "Some new Wavegroups observed on the records of the S. Pacific Earthquake of June 26, 1924". There is also a description of the contribution of Georgetown University to the Scientific Exhibit prepared for the meeting.

The Astronomische Nachrichten No. 5515, contains a biographical notice of the recently deceased Italian Astronomer Vincenzo Cerulli. The following paragraphs may be of interest to our Classicists, our Apologists as well as our Scientists.

"Cerulli was honorary Astronomer of the Vatican Observatory. His scientific labors did not prevent him from cultivating letters; he devoted himself "con amore" to the reading of Horace, Virgil and Cicero, and found time to describe in fine Latin distichs the fundamental concepts of the theory of optics.

For fear of not properly expressing the finer shades of meaning of the following paragraph on Cerulli's fervent Catholicity, I quote it in the original Italian:

"Egli ci dimostro con l'essempio essere ormai trascorsi i tempi in cui Scienza e Fede parvero inconciliabili, perche fu fervente cattolico senza finzioni od ipocrisie, ma iberamente, quale richeveda l'animo suo, aperto alla piu pura tradizione latina".

At the Summer Meeting of the Astronomical Society of the Pacific Father Paul McNally presented a paper on "New Elements and Ephemeris of Comet Pons-Winnecke".

During the first week of September three scientific societies met at Madison, Wisconsin. These were the Mathematical Association of America, The Mathematical Society and the American Astronomical Society. Four of our scientists were present, Fathers Poetcker, Macelwane and Theisen of the Missouri Province and Father Phillips of the Maryland New York Province. Before the Astronomical Society a paper on the personal equation in the observation of occultations was read by Father Phillips. The Hoya published the following account of the investigation.

During the summer Mr. D. Barry, S.J. of the Department of Mathematics acted as research assistant to the director in carrying on an investigation of the lag or personal equation of an observer in recording occultations or eclipses of stars by the moon. This lag or "reaction time" as it is termed in experimental psychology, has been determined for a great variety of actions, but had never been investigated in connection with this particular class of observations which is now becoming of very special importance in connection with researches on the moon's position and the question of the uniformity of the earth's rotation. A paper containing the chief results of this investigation was read by Father Phillips at the annual meeting of the American Astronomical Society held during the first week of September at Madison, Wisconsin.

It was found that an observer requires one third of a second to record the phenomenon,that is, the recorded time of the disappearance of a star when eclipsed is one third of second later than the actual occurence. The paper was discussed by Professor E.W.Brown of Yale University, by Professor Edwin Frost, director of the Yerkes Observatory, and by Dr. Albrecht.

Mr. Barry of Georgetown also informs us that the Washington Post in its Magazine section for Oct. 1, has a full page on Father Tondorf and that Gas Logic, a monthly published by the Consolidated Gas Co. of New York, has in its October number an article entitled "Listening in at Fordham to Earthquakes in the Antipodes" with a page of pictures of the Director of the seismological observatory Mr.Tynan, and of his instruments. We may add the following.

Popular Astronomy for Oct. 1927 has an article on Observatory Notes From the Georgetown College Observatory and also variable star observations made there.

Studies for September 1927 has an article on "A great discovery and its importance for Ireland" by D. O'Connell presumably of the Irish Province. It is a description already referred to of the Almeida Storage Battery and its possiblities.

The Catholic News of New York for Oct. 22, 1927 states that a collection of aerial photographs of Syria made by Fr. Poidebard (Prov. of Lyons) has just been received by the Academy of Letters and Inscriptions of Paris. Fr. Poidebard was authorized by the French High Command in Syria to make airplane flights over the volcanic area southeast of Damascus to obtain the pictures. It is stated that the photographs form an important contribution to the documentary history of the region. Tycos for October 1927 gives some interesting views of the Zi-Ka-Wei Observatory of our French Fathers in China.

SCIENCE SUMMER SCHOOLS.

The Science Summer School for the Scholastics of the Maryland New York and New England Provinces was again held at Holy Cross College during the summer part of July and August with Fr. Strohaver in charge. Fr. Strohaver gave instruction in Chemistry, Fr. Mahoney in Physics and Mr. Giessen in Biology. At Weston summer courses in science were given for the first time in the new science quarters. Biology was taught by Mr. Dubois and Mathematics by Fr. Merrick. Fr. Ahern and Mr. Gookin had charge of chemistry and Fr. Brock and Mr. T.McLaughlin had charge of the work in Physics.

The Weston Scholasticate:

The new building was finished in the spring, the first Mass being celebrated in the splendid chapel on Pentecost Sunday by Rev. Fr. Provincial. The philosophers moved from the north wing to the south wingimmediately after the latter was ready. The New England men came here from Woodstock for the retreat and for the ordinations, which were held in June for the first time in the new chapel. Bishop Collins of Fordham University, formerly of Jamaica, conferred Holy Orders upon eighteen of the New England Province. A deacon sent by Bishop Shuler was also ordained priest for the El Paso diocese. In August the remainder of the New Englanders at Woodstock migrated to their home in Weston. This year began with four years of theology,in addition to the three years of philosophy. The name of Fairview or Fairview House of Studies has given way to the more academic title of Weston College. By an affiliation arrangement, degrees will be conferred by Boston College. The new college was recently honored by the additional title of Collegium Maximum.

Woodstock College: Fr. P.Lutz who during his term of office as Rector built the beautiful chapel and the new wings and practically finished the new science building, besides adding many other improvements, became Tertian Instructor at St. Andrew-on-Hudson and was succeeded by Fr. V.McCormack formerly prefect of studies and professor of theology. The new science building was occupied in October. We hope to have a description of it in a later issue. There are now two years of philosophy at Woodstock. Fr. W.Brosnan is teaching Chemistry and Mathematics; Fr. W.Logue, Physics; and Fr. Didusch Biology. The latter took Fr. Fisher's place at Shadowbrook while Fr. Fisher was attending the Congregation of Procurators in Rome. In the meantime Fr. Tondorf of Georgetown had charge of the biology at Woodstock.

ORDINATIONS: Among those ordained this summer were the following members of the Association: Frs. David V. McCauley, John A. Pollock and Joseph B. Muenzen at Woodstock; Frs. Henry B. McCullaugh, and Joseph P. Merrick at Weston; and Fr. Frederick W. Sohon at Valkenburg. The bulletin congratulates them on having attained to the high dignity of the priesthood and wishes them many happy years of devoted service in Vinea Domini.

Father MARTIN'S GOLDEN JUBILEE.

On September 29th. Fr. Richard Martin, Professor of Chemistry at Fordham University, New York, completed fifty years in the Society. The Bulletin extends its congratulations and good wishes to him on his golden jubilee and rejoices that he is still active in educational work.