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# UNITAS

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AUGUST, 1937

## *Un Rector y un Profesor, Martires*

*Para el III Centenario de su glorioso triunfo.*

(24 y 29 de Septiembre de 1637).

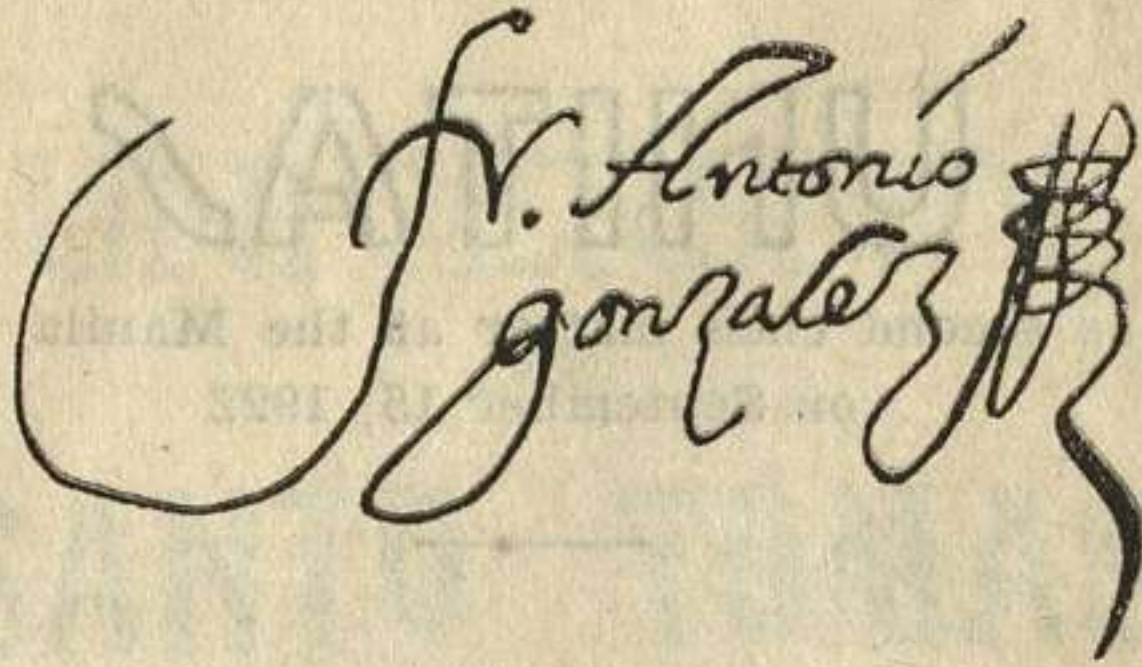
*por el P. A. Santamaría*

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Increible parecerá a muchos en estos tiempos que corremos el que haya habido un Rector de Santo Tomás y un Profesor de Prima que, dejando sus honrosos oficios, marcharan gozosos a predicar la Fe en el Japón, con la certeza de encontrar en pago una muerte ignominiosa de manos de los verdugos, y sin embargo la historia nos cuenta cómo el Rector, P. Antonio Gonzalez, y el P. Guillermo Courtet, por otro nombre P. Tomás de Santo Domingo, Lector de Prima de Santo Tomás, las dos primeras autoridades de nuestro Colegio-Universidad, salieron de Filipinas a mediados de Junio de 1636 con algunos compañeros y fueron martirizados en Nagasaki, isla de Kiu-shiu, en Japón, a fines de Septiembre de 1637.

No es nuestra intención el describir la vida y padecimientos de estos gloriosos defensores de la Fe, sólo queremos aquí recordar, con motivo del III Centenario de su muerte, esta ilustre efeméride de nuestra Universidad, que, aunque no sea la única de este género, pues ya están en los altares algunos de los que enseñaron en sus aulas, es una de las más puras de que puede gloriarse una institución católica. Además, tratándose actualmente de la Beatificación de estos Mártires, nos ha parecido útil para su causa anotar aquí algunas fuentes y da

tos que acaso sean desconocidos a los que la promueven ante la Santa Sede. (1)



El P. Fr. Antonio González había nacido en la ciudad de León, España, en cuyo Convento Dominicano profesó la vida religiosa, siendo nombrado, al terminar su carrera eclesiástica, Profesor de Filosofía y Maestro de Estudiantes del Convento de Piedrahita. Afiliado a la Misión que estaba recogiendo en España el célebre P. Collado en 1631, tuvo la desgracia de caer enfermo por lo que perdió por entonces las esperanzas de marchar a Misiones, aunque repuesto de su enfermedad hizo solo su viaje desde Trujillo hasta Sevilla donde alcanzó a sus compañeros embarcándose hacia Junio de dicho año con dirección a Veracruz. Entre ellos, en total 31, se encontraban el Protomartir de China, Beato Capillas, los célebres Misioneros de China VV. Francisco Diaz y Juan García, el que más tarde fué Provincial P. Jacinto Galí y el Cofundador de Letrán Fr. Diego de Santa María. De Acapulco salieron el 23 de Febrero de 1632 llegando a Manila a fines de Mayo del mismo año.

En Manila le dedicaron enseguida a enseñar Teología pues en el Capítulo Provincial de 1633 y de 1635 se le encarga la Cátedra de Prima de Santo Tomás. Aunque no hemos visto que nadie lo afirmara, creemos que por Noviembre de 1635 era al menos Vicario Provincial: entre las Cartas originales que se conservan en nuestro Archivo del Gobernador Hurtado de Corcuera dirigidas al Arzobispo Guerrero encontramos dos pasajes que parecen indicarlo. El primero es de 19 de Noviembre de 1635 y dice así: "Ayer vinieron a mi posada el Provincial de S. Francisco, y el P. Vicario Provincial de S. Agustín, y el que lo es de la Recolección de la misma Orden, y el

(1) Las fuentes principales de que nos hemos servido son el **Tomo primero de la historia de la Provincia del Santo Rosario de Filipinas** por el P. Aduarte, añadida por el P. Domingo González, impresa en Zaragoza por Domingo Gascón en 1693, que es reimpresión de la de Manila, Santo Tomás, 1640, en que el P. González, en los Capítulos LX y LXI, reprodujo en substancia su opúsculo **Relación del ilustrísimo martirio de los Padres Fray Antonio Gonzalez Vicario Provincial en Japon, Fray Guillermo Cortet, Fray Miguel de Ozaraza y Fray Vicente de la Cruz, Religiosos de la Orden de N. P. S. Domingo y dos compañeros seglares el año pasado de 1637, compuesta por el Padre Fray Domingo Gonzalez, Comisario del Sancto Officio de la Orden de N. P. S. Domingo**, impresa en Manila, Santo Tomás, 1938 (ARCHIVO DE PROVINCIA, IMPRESOS, tomo 145), reimpressa en

P. Fr. Antonio Gonzalez de la de Santo Domingo. Todos cuatro me pidieron de parte de las Religiones lo mismo que V. S. en sus papeles...". (2) Otro de 21 de Noviembre dice: "Se dió (en una Junta por él reunida) poco crédito al testimonio del P. Fray Pedro de Herrera (3) y al mandato del Padre Fray Antonio Gonzalez porque ambos a dos son cómplices..., de suerte que ni el mandato del Padre fray Antonio ligase al P. fray Diego Collado ni a otro de sus Religiosos..." (4) El ir con los Prelados de la otras Ordenes gestionando *de parte de las Religiones*, y el *imponer mandatos* sin ser Provincial, Prior o Rector, pues estos oficios los ejercían entonces los PP. Domingo Gonzalez, Cristobal de Leon y Francisco de Herrera respectivamente, creemos ser motivos suficientes para suponerle ejerciendo las veces del Provincial, a no ser que sucediera al P. Jerónimo de Belén en el oficio de Vicario Provincial de la Provincia de Manila, pero no nos consta que éste cesara en su cargo; más probable parece que debiendo ausentarse el P. Domingo González le dejara de Vicario General suyo durante la ausencia (5).

Por el mes de Abril de 1636, habiendo sido elegido Prior el Rector P. Francisco de Herrera, quedó en su lugar nuestro Venerable Padre González como Lector que era de Prima. Los documentos académicos que se conservan son posteriores, por lo cual no hallamos rastro de su Rectorado, pero de él consta en el elogio que de su muerte hizo el Capítulo Provincial de 1639, y lo afirma el P. Ocio en el Compendio que hizo de su

(2) ARCHIVO, LIBROS, tomo 49, fol. 73.

(3) Ni entonces ni nunca, al menos que nos conste, ha habido ningún Pedro de Herrera en la Provincia Dominicana de Filipinas. En 1635 había un P. Juan de Herrera, Vicario de Buguey, y el P. Francisco de Herrera, que había sido Provincial y entonces era Rector de Santo Tomás y Comisario del Santo Oficio, a quien debe referirse el Gobernador Corcuera, equivocando los nombres (**Acta Cap. Prov.**, vol. I, pag. 177). No es extraño que Corcuera llame cómplices a los adictos a la Provincia a quien él tanto persiguió. Cuando se le estaba tomando la residencia, mientras se le seguían varias causas criminales, civiles y eclesiásticas, y contenciosas por valor de varios millones, tanto de parte del Gobierno como de las Corporaciones Religiosas y particulares, el Consejo Provincial de la Provincia Dominicana determinó perdonarle y no aumentar más su desgracia (ARCHIVO DE PROVINCIA, MANUSCRITOS, tomo 571). Esta es la venganza religiosa.

(4) ARCHIVO, LIBROS, tomo 49, fol. 75.

(5) **Acta Cap. Prov.**, vol. I, pag. 174 y siguientes.

Madrid por Diego Diaz, 1639. OCIO **Reseña Biográfica de los Religiosos de la Provincia del Santísimo Rosario de Filipinas**, Manila, Santo Tomás, 1891, Primera Parte, pag. 258-279, y **Compendio de la Reseña Biográfica**, etc., Manila, Santo Tomás, 1895, pag. 141 y 156. También se halla en el ARCHIVO DE PROVINCIA, MANUSCRITOS, tomo 9, una Biografía del P. Antonio Gonzalez, que suponemos hecha por el P. Ocio.

Reseña. (6) Dos documentos existen en nuestro Archivo que le llaman Rector: uno es el poder otorgado por el Presbítero escocés, Maestro Diego de Estrada, en 4 de Mayo de 1636 para que los Padres Domingo González, Provincial, Antonio González, Rector del Colegio de Santo Tomás, y Tomás de Santo Domingo, Lector de Teología, o cualquiera de ellos *in solidum* hagan en su nombre testamento de sus bienes, por creer que la gravedad de su enfermedad no le dará tiempo para hacerlo por sí mismo. (7) El otro documento es un proceso hecho ante el P. Francisco de Paula, Vicario de los Santos Reyes del Parian, como Gobernador, Juez Provisor y Vicario General del Arzobispado de Manila, nombrado por el Sr. Guerrero durante su destierro, en el cual se le llama Rector del Colegio de Santo Tomás de esta Ciudad de Manila; de dicho documento hemos sacado el facsimil de su firma que ofrecemos. (8)

Fr. Thomas de S.<sup>to</sup> Domingo

El P. Tomás de Santo Domingo, que en el siglo se había llamado Guillermo Courtet, nació de padres nobles en Seriguan, Provincia de Beziers, Departamento de Herault, en el Languedoc, Francia, y profesó en la Congregación de San Luis de la Orden Dominicana. Después de haber enseñado varios años Teología en diversos Conventos de Francia, obtuvo el ser incorporado a esta Provincia de Filipinas en la Misión que saliendo de España por Junio de 1634 y de Acapulco el 4 de Abril de 1635 llegó a Manila en, o poco antes del 24 de Junio de 1635, conocida en la historia por la *Misión de los barbones*, por venir todos ellos, eran 25, con luengas barbas con intención de pasar a Japón como pertenecientes a la Congregación de San Pablo que trató de fundar el presidente de dicha Misión, P. Diego Collado. En las grandes discusiones que con este motivo hubo en Manila, en las que aparece el gran contraste de que el Provincial de Filipinas, P. Domingo González, defiende el Patronato Real contra las decisiones y abusos del Gobernador y Capitán General, Hurtado de Corcuera, el P. Courtet se mantuvo al principio de parte del P. Collado, pero pronto se puso de parte de la Provincia, que le destinó a enseñar Teología en Santo Tomás, con cuyo oficio se le designa en el poder arriba

(6) Pag. 141. El P. Domingo González en la continuación de la Historia no dice que fuera Rector de Santo Tomás, y creemos que tampoco en el Opúsculo, acaso por haberlo sido tan poco tiempo y durante las vacaciones. Tampoco lo dice el P. Ocio en su **Reseña**.

(7) ARCHIVO, LIBROS, tomo 49, fol. 350-351.

(8) **Ibidem**, fol. 88 vuelto. La firma del P. Courtet (Fr. Tomás de Santo Domingo) está tomada del fol. 38 vuelto.

indicado de 4 de Mayo de 1636 del Maestro Estrada nombrándole como uno de sus procuradores para hacer testamento. (9)

El martirio que habían padecido en Japón los últimos Misioneros Dominicos en los años 1633 y 1634 no sólo no acobardó los ánimos de los Religiosos que quedaban en Manila, sino que les dió ánimo y movió a solicitar el ser enviados a propagar la fe en dicho reino. Nuevo motivo fué la llegada a Manila de algunos españoles que habiendo naufragado en 1634 en las Islas de Lequios, narraron la insistencia de los cristianos que de noche se acercaban a ellos buscando Sacerdotes que les administraran los Sacramentos. Pero si grandes eran los deseos de muchos Religiosos de pasar a Japón y de los Superiores de enviarlos, no era tan fácil la ejecución de dicho proyecto por la oposición de las autoridades civiles. Ya en 18 de Julio de 1624 la Real Audiencia dió un mandato a las Justicias de las Provincias de Pangasinan, Ilocos y Nueva Segovia para que no dejaran sin permiso escrito de la misma salir embarcaciones para los reinos vecinos, especialmente para el Japón. (10) El 26 de Mayo de 1631 el Rey expidió una Real Cédula mandando al Gobernador de Filipinas que no dejara salir de las Islas a los Religiosos de Santo Domingo (11); el Gobernador en carta de 4 de Agosto de 1630 da cuenta al Rey de haber impedido a ciertos Religiosos de Santo Domingo, San Francisco y San Agustín pasar a Japón para recibir el martirio (12), y en otra de 12 de Julio de 1632 habla de la conveniencia de negar a las Religiones la entrada a las conversiones del Japón. (13) “No hubo poca dificultad (dice el P. Domingo González en la Historia) en despachar estos cuatro Religiosos, porque si en Japón tienen tanta diligencia tomados todos los Puertos para que ningún Sacerdote del verdadero Dios les entre a predicar el Evangelio, y para esto tienen puestas gravísimas penas y las ejecutan con rigor, el gobierno secular y político de estas Islas no se descuida en esto, antes pone gran cuidado y vigilancia para que de aquí no salgan para Japón ni China, con gravísimas penas a los Pilotos y Marineros que los llevaren, cosa que hace la jornada dificultosísima, y de muy mayor costa, porque no se hallan, o si

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(9) *Ibidem*, fol. 350; OCIO, **Compendio**, pag. 155. En el citado tomo 49 de los LIBROS del ARCHIVO, hay muchos documentos relativos a las disensiones con motivo de la fundación de la Congregación de San Pablo.

(10) ARCHIVO, LIBROS, tomo 49, fol. 283. Es un documento original con el testimonio de haber sido notificado a las Justicias de Pangasinan, Ilocos y Nueva Segovia; puede ser interesante para la historia de Filipinas.

(11) ARCHIVO DE INDIAS, estante 105, cajón 2, legajo 1, tomo III, fol. 194 vuelto (**Catálogo**, n. 14727).

(12) De ella se habla en la Real Cédula de 27 de Enero de 1632, que se halla en el mismo volumen, fol. 203 (**Catálogo**, n. 14901).

(13) ARCHIVO DE INDIAS, 67—68 (**Catálogo**, n. 15027).

alguno se atreve es menester aumentarle la paga mucho más por estos peligros a que se ponen que por el trabajo ordinario". (14)

Si estas dificultades venían ya de atrás mucho mayores lo serían en 1636 en que el Gobernador Corcuera estaba en tan malas relaciones con las Religiones en general (excepto con los Jesuitas), (15) que estaban de parte del Arzobispo Guerrero, quien terminó por ser desterrado en Mayo del mismo año, y con los Dominicos en particular, a quienes había despojado de varias Casas para entregarlas a la Congregación de San Pablo. Después de haber hablado el citado historiador de cómo se encontró gente que acompañara a los Religiosos, añade: "Vencida ya en parte esta dificultad, que se la mayor, quedaba la que acá tienen el despacharlos, que es muy grande, porque el Gobernador de estas Islas, (16) avisado de nuestra determinación, por quien debiera no estorbar esta jornada, andaba con grandísimo cuidado de que no se hiciese, y sabiendo que se fabricaba una embarcación al modo de Japón para este efecto, la hizo quemar y destrozar, llevándose hasta las tablas de que se hacía, y teniendo noticia del que había de ir por Piloto lo estorbó, perdonándole lo que contra él tenía, que a su parecer era digno de muerte, con condición que dejase este viaje, como lo dejó, y demás de esto puso centinelas en las bocas de la Bahía para que no pudiesen los Religiosos hacer viaje". (17)

"Pero el Señor, continúa el mismo, que lo había dispuesto de otra suerte y quería que estos Religiosos le glorificasen padeciendo por El en Japón extraordinarios tormentos y gloriosas muertes, deshizo todos estos impedimentos, dió navíos y piloto y quitó los soldados guardias, y dió puerta franca para que fuesen a donde los tenía predestinados; con que alegres comenzaron su viaje, aunque muy faltos de gente de mar, como personas que salían a sombra de tejados". Los que salieron eran el P. Fr. Antonio Gonzalez de Vicario Provincial del Japón, el P. Guillermo Courtet, el P. Miguel de Ozaraza, Guipuzcoano, el P. Vicente Xivozzuca de la Cruz, que siendo Cate-

(14) ADUARTE, *Historia*, pag. 749.

(15) Según dice el P. Pastells, en la *Historia General de Filipinas*, que precede al *Catálogo de los Documentos, etc.*, vol. VIII, pag. CII, el Gobernador Corcuera facilitó al P. Mastrilli la ida al Japón proporcionándole un Champán construido expresamente para dicho viaje. Salió de Filipinas el 11 de Julio de 1637, llegó a Japón el 19 de Septiembre, fué preso el 14 de Octubre y, después de padecer cruelísimos tormentos, degollado el 17 de Octubre con un compañero (*Ibidem*, pag. CVI).

(16) Nótese que la Historia en que esto se cuenta se publicó en Manila el año 1640, en que todavía era Gobernador Corcuera. La persona que dice el P. Gonzalez que avisó al Gobernador y debiera no estorbar esta jornada, creemos que fué el P. Collado, que todavía se hallaba en Filipinas, y a quien tampoco nombra al relatar lo relativo a su Congregación.

(17) ADUARTE, *Historia*, pag. 750.



quista en Japón fué desterado y se ordenó después de Sacerdote en Manila tomando el Hábito Dominicano poco antes de salir para Japón, y dos seglares: uno "mestizo, hijo de Chino y de India de esta tierra" llamado Lorenzo Ruiz, natural de Binondo, y el otro un japonés leproso, natural de Macao, "que había sido antes por la Fe desterrado de Japón" probablemente uno de los 130 leprosos cristianos que fueron desterrados a Manila en 1632 después de ver que era imposible hacerlos apostatar. (18)

Salieron de Bataan y hacia el día 15 de Junio como escribía el P. Collado en dicha fecha al Gobernador Corcuera, aunque suponía que el P. Antonio González era despachado para España. (19) Cerca de un mes tardaron en llegar a los Lequios, tiempo que emplearían en perfeccionarse en la lengua japonesa, que habrían empezado a estudiar en Manila, para lo cual tenían el hermoso Diccionario nuevo que acababa de imprimirse en Manila, arreglado del portugués por el Profesor de Santo Tomás, P. Jacinto Esquivel, que ya había sido muerto alevosamente cuando se dirigía al Japón en 1633. (20)

Llegados a los Lequios el 10 de Julio de 1636 cree el P. Domingo González que fueron presos inmediatamente que se mostraron predicando la Fe y allí los tuvieron presos durante un año, desde donde los llevaron en dos tandas a Nagasaki. Primero llegaron los PP. Courtet, Ozaraza y Xivozzuca el 13 de Septiembre de 1637 a las cuatro de la tarde, y después el P. Antonio González con el mestizo chino y el japonés el día 21 del mismo mes a las dos de la tarde. No queremos extendernos en describir los interrogatorios a que fueron sometidos ni las veces que sufrieron con grandísima constancia los martirios del *agua*, de la *horca y cueva*, y de las *agujas* entre uña y carne. El P. González, después de padecer dos veces el martirio del agua, murió en la cárcel el día 24 de Septiembre animado por sus hermanos con quienes podía comunicar por las rendijas de las paredes. Los Padres Courtet, Ozaraza y Xivozzuca fueron decapitados el día 29 de Septiembre, no pudiendo

(18) El Gobernador Don Juan Niño de Tabora dice al Rey en carta de 2 de Julio de 1632: "Para que la cristiandad no fuese tan perseguida, no parece serme malo hubiese un poco de revolución; por menos precio o por interés envían en estos navios desterrados a esta Isla 130 pobres lázaros que habiendo procurado renegasen de la fe de Cristo (como otros muchos), no lo pudieron recabar con estos" (ARCHIVO DE INDIAS, 67-6-8; **Catálogo**, vol. VII, pag. CLXXIV).

(19) Traslado fiel de esta carta se halla en ARCHIVO, LIBROS, tomo 49, fol. 53. De esta carta deducimos lo dicho en la nota 16.

(20) **Vocabulario de Iapon declarado primero en portugues por los Padres de la Compañía de Iesvs de aquel reyno, y agora en Castellano en el Colegio de Santo Thomas de Manila. Con licencia en Manila, por Tomas Pinpin, y Iacinto Magaurlua. Año de 1630.** Contiene 617 folios. Fué traducido del impreso en Nagasaki en 1603. En el ARCHIVO de la Universidad existen dos ejemplares.

serlo los dos seglares por haber muerto durante el tormento de la cueva. Sus cuerpos fueron quemados en el llamado por los cristianos *Monte Santo*, y las cenizas arrojadas al mar a tres leguas de Nagasaki, junto a unas islas que nuestros historiadores dicen llamarse *caballos*.

El P. Francisco Pinelo, que había sido el Presidente de la Misión de 1632, en que vino el P. Antonio González, pasando por Macao en ocasión que llegaron seis navios en que venían cerca de mil hombres que se habían hallado presentes al glorioso martirio, pidió a las autoridades eclesiásticas de Macao en 23 de Noviembre de 1637 se hicieran Informaciones sobre su martirio, en las cuales fueron oídos 19 testigos desde el día 24 de Noviembre hasta el 10 de Diciembre. (21) En nuestro Archivo se conserva una "Memoria de los testigos que se hallaron en Japón al Martirio de los Venerables PP. Fr. Antonio Gonzalez, Fr. Guillermo Courtet, Fr. Miguel de Ozaraza y sus compañeros, año de 1637. 20 de estos testigos van en la Información que hizo en Macao año de 39 y se despachó a Roma de aquí de Manila este mes de Agosto de 1650 años. Y se guarda esta memoria para buscar de estos testigos cuando venga el Rótulo de Su Santidad para hacerse por orden de la Silla Apostólica la Información para canonizar a estos Venerables y Santos PP." (22). Contiene una lista de 120 testigos.

El 27 de Diciembre de 1637 llegando desde Macao a Manila un patache conducido por el Capitán Juan López de Anduin trajo la noticia del martirio del Jesuita P. Mastrilli y de nuestros mártires, por lo cual hubo inmediatamente repique general de campanas y se cantó, primero en San Ignacio y después en Santo Domingo, un solemne Te Deum por el Dean con la asistencia del Arzobispo, Audiencia, Religiones y otras personas de categoria, y por la noche nuevo repique de campanas y luminarias. (23) En esto se seguía lo que en 1598 aconsejó el Sr. Benavides al Virrey de Méjico que le consultaba si se podía hacer procesión solemne en acción de gracias por el martirio de los Mártires Franciscanos, San Pedro Bautista y compañeros, que habían sido crucificados en Japón el año 1597, como lo había solicitado el Comisario General de San Francisco, Obispo electo de Cáceres, diciendo que bastaba tener suficiente prueba de la sentencia que los condenaba por haber predicado la Fe Católica, pues no se trataba de honrar y ca-

(21) Estas Informaciones, menos la petición del P. Pinelo que está en castellano, están en portugués. En ARCHIVO, FOLLETOS, tomo 16, fol. 91-117 hay una copia certificada por el P. Andreu como fielmente sacada del ejemplar auténtico que hay en el ARCHIVO DE PROVINCIA.

(22) ARCHIVO, LIBROS, tomo 49, fol. 248.

(23) Así se cuenta en un MS que narra los "**Sucesos de la Islas Filipinas, 1637-1638**" existente en la Biblioteca de la Real Academia de la Historia, de Madrid, Papeles de Jesuitas, tomo 84. n. 35 (**Catálogo, PASTELLS, Historia, vol. VII, pag. CV**).

nonizar a las personas sino de la causa y título de su muerte que ya están canonizados por Dios y por su Iglesia y Libros Sagrados, “y en honra de esta causa y título digo yo que es acto de religión imperada de la Fe que se haga la dicha procesión”. (24)

En los Capítulos Provincial de 1639 y General de 1644 se hace el elogio de estos venerables mártires (25), y a ellos creemos que se refieren las siguientes palabras del Rey de España en Cédula Real de 7 de Julio de 1640 respondiendo a la Carta de la Real Audiencia de 2 de Agosto de 1638: “Por la desorden grande que algunos Religiosos de esas Islas tienen en pasar al Japón con justo y santo celo, donde la persecución a la cristiandad está en gran fuerza y aprieto y que muchos de ellos se van sin aprender la lengua, con que apenas son llegados son cogidos y martirizados sin que tenga efecto el fruto principal de la conversión y que cualquier navío que va allá por sólo que se lleven Religiosos o que se hallan algunas imágenes, breviarios o rosarios, toman por perdido el dicho navío y cuanto va en él, aprisionando la gente hasta que padecen los constantes en la Fe martirio, de que se siguen muchos y considerables inconvenientes y por esta razón han sido y son también perseguidos los portugueses de Macan; y atropellando con todo lo referido fueron ahora dos años al dicho Reino algunos Religiosos de Santo Domingo, San Agustín y Compañía de Jesús en un navío que para este efecto dispusieron con gran secreto, sin licencia del Provisor, los cuales luego que entraron en él fueron asimismo martirizados;...” (26)

La fama de este martirio se conservó largo tiempo en Manila: en la Información hecha a fines de 1649 y principios de 1650 sobre el Colegio de Santo Tomás, aunque los demás testigos hablan de Mártires del Japón en general, tres de ellos hablan expresamente de los nuestros el Dr. Alonso Zapata, el Maestro Francisco Martínez de Paz y D. Diego de Baeza. (27) En el Claustro superior del Convento de Santo Domingo de Manila se conserva un cuadro antiguo titulado “Ultimo Mártires de Japón 1637” en el cual aparecen al lado derecho del expectador nuestros Mártires formando un grupo.

(24) De un MS original firmado en Méjico, 8 de Enero de 1598 por **Fr. Miguel, Obpo. de la nueva Segobia**, con el título siguiente de tiempo posterior: **Parecer del Sr. Benavides de que se puede hacer procesión en nacimiento de gracias por el Martirio de los Santos Mártires de Japón, no en honra de los Mártires, sino de la causa porque murieron.** Contiene un preámbulo y 4 Conclusiones, en 4 folios.

(25) **Acta Cap. Prov.**, vol. I, pag. 191; Actas del Capítulo de Roma de 1644 (sin portada) pag. 30. En este Capítulo asistió como Definidor por la Provincia de Filipinas el célebre Misionero de China, P. Juan Bautista de Morales, que haciendo una verdadera odisea, fué a Roma a defender las opiniones de los Dominicos sobre los Ritos Chinos.

(26) La trae **PASTELLS, Historia**, vol. VIII, pag. CCXLI; en el **Catálogo** n. 17276, se le pone la fecha 12 de Julio. **ARCHIVO DE INDIAS**, 105-2-2.

(27) **Documentos Históricos**, pag. 61, 71 y 72.

La sangre de los Mártires del Japón no fué completamente inútil para la propagación de la Fe, pues fortaleció de tal manera la de los cristianos japoneses que, apesar de haber estado cerradas a cal y canto las puertas a los Misioneros durante más de dos siglos, al volver los Misioneros del siglo pasado al Japón todavía encontraron rastros del antiguo cristianismo. Ojalá que la Iglesia les conceda pronto el premio merecido de ser colocados en los altares junto a otros que también fueron Profesores de Santo Tomás y ya han sido beatificados.



# SOCIAL SCIENCES

## *Eugenesis vs. Eugenesia*

Por el Rev. F. del Rio, O. P., S. T. D

(Conclusión)

### II

LINEAS GENERALES DENTRO DE LAS QUE UN MOVIMIENTO EUGENESICO ES ADMISIBLE Y HASTA-MUY LAUDABLE, SEGÚN LOS PRINCIPIOS DE LA MORAL CATOLICA.

*"As Catholic Eugenics we may designate that movement for race betterment which in all its aims and measures scrupulously respects the law of God."* (Ch. P. Bruehl, op. c., p. 219)

Cualquiera que sea ó haya podido ser la actitud de algunos católicos—mejor intencionados que inteligentes—con respecto al eugenismo—es bien cierto que no existe *una actitud de oposición universal y cualificada* con respecto a un verdadero eugenismo y como prueba de ello, tenemos las conclusiones aprobadas en el II Congreso Internacional de Médicos Católicos, del que ya hicimos mención antes, y que versó sobre "El *Eugenismo y la Esterilización*". Las conclusiones 4a. y 5a. de dicho Congreso son del tenor siguiente:

4) "...Las medidas eugenésicas deben de ser de carácter *positivo*. En este campo la obra de la Acción Católica consistirá no en una mera observación pasiva, sino más bien en una activa intervención, mediante...

- a)—la institución de burós de consulta para las jóvenes (a fin de disuadir las de contraer matrimonios con pronóstico de herencia desfavorable, etc), para las personas casadas, para las madres, y éstos burós deben de estar en íntima inteligencia con los organismos de la salud pública, y de profilaxia del Estado o de la comunidad;
- b)—la institución y el fomento de los estudios médicos complementarios en el campo de la higiene social y de la eugenesis; la difusión de los conocimientos biológicos, eugenésicos, y de *higiene social*; entre el clero extensión de la medicina pastoral;
- c)—prestando apoyo a los esfuerzos del Estado y de la comunidad, en las medidas de *segregación y aislamiento*, favoreciendo las instituciones sociales establecidas para hacer desaparecer las llamadas

“plagas sociales”—taxicomia, alcoholismo, enfermedades venereas, etc.

5) “Se propone:

A) Organizar entre todas las asociaciones médicas católicas una colaboración internacional, en las cuestiones de eugenesia, en las investigaciones sobre la herencia y especialmente sobre la esterilización, **Modos y medios de acción:**

- 1) Presentar a todas las asociaciones programas de acción, y de problemas especiales que se han de estudiar y resolver; por ejemplo, sobre las condiciones de la esterilización, y sobre el estado real de la degeneración, que, se dice, ir en aumento: sobre el valor positivo y negativo de los factores anormales, sobre las cuestiones de herencia, sobre los resultados adquiridos hasta el presente en la práctica de la esterilización;
- 2) Centralizar y establecer intercambio de los resultados y de las publicaciones científicas importantes;
- 3) Crear una publicación central y Comisiones de Estudio compuestas de médicos y de teólogos.

B) Editar informes y breves resúmenes sobre los problemas relativos a la esterilización...

El Congreso toma nota del hecho de que la ciencia confirma las exigencias de la enc. “Casti connubii”, sobre el matrimonio. El Congreso cree que se pueden extender las investigaciones en el campo de la biología; o de la herencia y de la eugenesia.

El Congreso hace un llamamiento a los médicos católicos de todas las nacionalidades a fin de que ellos tomen parte en estas investigaciones y ayuden a propagar en un sentido cristiano las tendencias eugenésicas positivas”. (20)

Existen dos modos fundamentales de procurar el mejoramiento del hombre—bien perfeccionando al individuo o bien perfeccionando la raza. El primer método, escribe H. Walter, consiste en sacar el mejor partido posible de lo que el individuo ha heredado, colocando al individuo en el medio ambiente más favorable, y desarrollando sus talentos lo más posible, mediante la educación la más completa. A este fin concurren una infinidad de factores. El segundo método consiste en buscar una mejor herencia con la que el individuo empiece la vida.

El primer método es inmediato y urgente para la generación presente; el segundo mira los ideales del hombre de mañana y consiguientemente no llama tanto la atención del individuo de hoy. El primero es el método conocido con el nombre de “eutenia, euthenics”, y el segundo llamado “eugenesia, eugenics”.

Estos aspectos del perfeccionamiento humano son sin embargo inseparables. Toda característica hereditaria debe de ser considerada, no como una unidad independiente, sinó como una reacción entre el plasma germinal y el medio ambiente. El biólogo que ignora los efectos de la educación y la influencia del medio ambiente, comete un grave error lo mismo que el soció-

(20) Cfr. *Saint Luc Médical*, Anno XIV, N. 4, 936, pp. 323-324: “II Congrès International des Médecins Catholiques à Vienne.—Resultats et Conclusions.

logo que no considera suficientemente la importancia fundamental del plasma germinal.

Sin las oportunidades que le procura la eutenia la mejor herencia nunca vendría a ser una plena realidad, y sin el fundamento eugenésico la mejor oportunidad del mundo sería una oportunidad inútil (21).

Algunos han querido restringir, tal vez demasiado, el campo eugenésico basándose para ello en frases del mismo Galton, al limitarse al estudio de las leyes de la herencia, haciendo caso omiso "de los factores del medio ambiente en sí mismo considerado" (22), y al que solamente tienen en cuenta en cuanto puede ayudar o impedir el desarrollo de las líneas superiores o más perfectas. Otros, entre ellos Hermann Muckermann (23) y R. De Guchteneere (24) haciendo uso igualmente de definiciones dadas por Galton conceden una participación *más directa* al elemento 'medio ambiente' en el programa eugenésico. Como al presente, esta cuestión es para nosotros de importancia muy secundaria, omitimos el razonar la segunda opinión en favor de la cual estamos.

El *eugenismo* se propone estudiar las leyes de la herencia con el objeto de *conocer* científicamente, y, después *aplicar* los medios de procrear bajo condiciones las más favorables al perfeccionamiento de la raza. Trata, de *averiguar* y *hasta cierto punto también* de *imponer* las condiciones que cada individuo, cada pareja, debe de esforzarse por poseer, a fin de tener hijos físicamente perfectos (25).

Nuestra oposición no es al eugenismo en sí, y en cuanto a su fin u objetivo, sino más bien al eugenismo *moderno* y en cuanto a los medios que emplea para conseguir su fin, i. e. medidas *coercitivas*, de carácter casi exclusivamente *negativo*, *verdadero destructor de la raza misma que aparentemente trata de perfeccionar*, e *inmoral*. A este *falso eugenismo* oponemos un *verdadero eugenismo* cuyas características, en oposición a las de falso eugenismo, son: *eliminación casi absoluta de medios coercitivos*, de carácter *positivo*, *comprensivo*, *humano* y *moral*.

El verdadero eugenismo debe eliminar cuanto sea posible de su programa de acción las *medidas coercitivas*. El éxito de un programa eugenésico, ni debe, ni puede depender de medidas violentas. A. J. Todd, autoridad bien poco sospechosa de prejuicios católicos, escribe: "The wiser among the eugenists reject utterly all notions of external compulsion. They decline,

(21) Cfr. **Genetics** by Herbert E. Walter.—New York, The MacMillan Co., 1929: pp. 314-315.

(22) Cfr. **An Examination of Eugenics** by H. Robbins.—London, Burns and Oates and Washbourne Ltd, 1930: ch. I, pp. 2-8.

(23) Cfr. **Eugenik** von Hermann Muckermann.—Fred. Dümmlers Verlag.

(24) Cfr. **Saint Luc Medical**, Anno XIV, N. 1, 1936, pp. 40 ss. Berlin und Bonn.—1934: pp. 12 ss. Ursprung und Entwicklung der Eugenik.

(25) Cfr. **Déontologie médicale d'après le Droit naturel** par G. Payen, Chang—Hai. Zi-ka-wei.—1935; pp. 211 ss.

as some body recently put it, to 'conjugate biology in the imperative mood', and *appeal only to the educated public opinion for the realization of their ideals*'. (26)

Hay un mundo de verdad en esta atinada observación: aquellas leyes o regulaciones que no tienen en su favor la opinión pública son prácticamente inútiles, y sería mejor acabar con ellas. Tenemos un ejemplo de ésto en la llamada "Prohibition Law" de Estados Unidos de Norte América. En cambio, la opinión pública, aún sin sanción legal de ningún género, posee un poder poco menos que irresistible, y que pocos se atreven a despreciar.

Ahora bien, la formación de la opinión pública, sobre esta materia, mediante la educación eugenésica debe de tender a hacer penetrar en las masas las nociones elementales de *selección humana*. En un programa eugenésico la selección acertada de compañero o compañera para toda la vida, es de importancia suma, pues sabido es que los hijos, por lo menos en cuanto a su parte física, no son sinó el resultado o combinación de las cualidades que en estado actual o potencial se hallan en los padres. Muchos factores pueden intervenir en esta elección, pero entre todos ellos, la "aptitud física" debiera de ocupar un lugar inmediatamente después de la "aptitud moral", que debe siempre de estar en primer puesto. Otros factores, como el prestigio social, las riquezas, la belleza física, etc. todos son muy secundarios comparados con los dos mencionados factores. Ciertamente a la "aptitud física" debiera dársele más importancia de la que hasta el presente generalmente se la ha dado.

La educación eugenésica debe de tender a ilustrar a los padres y personas jóvenes para que no creen uniones de las cuales la prole resulte verdadera y notablemente defectuosa. Para lograr este objetivo es menester varias cosas. La más importante es el formar y desarrollar en dichas personas el *sentido de responsabilidad social*, a fin de que no se dejen guiar únicamente por la pasión sexual y bajos intereses en una materia y asunto que tan profundamente afecta el futuro de la sociedad. Consciente nuestra juventud de sus fundamentales deberes para con la sociedad, debe de preservarse a toda costa inmune de aquellos defectos o enfermedades evitables y que pueden producir la *degeneración de las células germinales*. Los dos como—venenos de la raza humana son el *alcoholismo* y las *enfermedades venéreas*: estas son responsables en gran parte de la alarmante degeneración que hoy en todas partes observamos, no obstante todos los adelantos de la ciencia médica. *Entre las causas conocidas de defecto o enfermedad hereditaria, las que más se destacan son precisamente estos dos venenos raciales*. De tal modo penetran el organismo del hombre

(26) Cfr. *Theories of Social Progress* by Arthur J. Todd, Ph. D.—The MacMillan Co., New York, 1930: pp. 266-267.



que llegan a influenciar profundamente y deteriorar notablemente las células germinales de aquellos que son o serán padres de familia, de donde naturalmente resulta que la prole es incapaz de desenvolvimiento normal. No es exagerado el afirmar que la eliminación de las enfermedades venéreas, en particular, significaría la eliminación de la mitad de las personas que se hallan viviendo en las instituciones de beneficencia para defectuosos o enfermos. Esto aparte de los males que se siguen a la prole, efecto de tener padres dados al alcoholismo o con enfermedades venéreas. Aquí aparece claramente el valor eugenésico de las dos virtudes altamente cristianas, que el mundo moderno barbaramente ignora—la templanza y la castidad, cuya práctica debe de inculcarse más y más (27). Debiera el interesado en caso de enfermedades o defectos transmisibles al consorte o a la descendencia, o abstenerse del matrimonio o diferirlo hasta que haya tenido lugar la curación completa. (28)

(27) Cfr. **Birth-Control and Eugenics** by Ch. P. Bruehl, Ph. D.—New York. Joseph F. Wagner Inc.—1928; p. 208 ss.

(28) "The two racial poisons that are responsible for a vast amount of degeneracy, escribe Fr. Davis, are alcoholism and venereal infections. ...The other poison, and scourge of the race, syphilis, is still more disgenic. It affects all the organs of the body, the brain, the nerves, and issues in general paralysis. To counter these scourges, the Catholic eugenist impresses on all the members the importance of the virtues of temperance and chastity. She would deter a girl from marrying a drunkard, however wealthy and well-born he may happen to be. An habitual drunkard who foresees that he will not be able to live a decent life with his wife and children, has no right to marry. A syphilitic has as little right to marry unless his intended wife fully knows of his condition and is willing to marry him. But, if they do marry, they are bound to safeguard their offspring from infection, and if the offspring is infected, to take timely measures to have it cured by competent medical help. It is certain that a child of a syphilitic father and a healthy mother may be born healthy but will develop signs of the disease in a few weeks or months. The stigmata of the disease can be transmitted to the offspring of the third and probably of the fourth generation. The wife is so liable to be infected, and the consequences are so dreadful, that no girl should marry without very good evidence of the health of the partner.—**Contraception** it is stated on good authority, has become the strongest ally of venereal diseases, chancroid, gonorrhoea, and syphilis, and more than anything else has carried these diseases into the sacred precincts of wedded life and home... In order to prevent the miseries that ensue from these diseases, it has been thought by some well-intentioned social workers that the public should have easy access to health stations, or clinics, where people may be taught how to be disinfected and indeed to disinfect themselves, should they contract the disease; and more than this, namely that they should, if they wish, carry about with them the necessary disinfectants. The advocates of this method of prevention of the spread of venereal diseases would have boys and girls, on reaching the age of puberty, taught these methods. All such propaganda banishes the sense of decency, and we can not doubt it, fills the minds of the habitués of these clinics with too frequent and too facile a preoccupation with sexual matters, so that the proposed remedies are calculated to do immense amount of moral harm. In some countries health certificates before marriage are required of the man. We believe that the Catholic moral doctrine does not object to the health certificates in principle." Cfr **Eugenics**.—Aims and Methods.—By Henry Davis, —London. Burns and Oates and Washbourne Ltd. 1930: pp. 63-66.

La *selección racional* que debe de hacerse del consorte, será de todo punto imposible, a no ser que la pasión sexual se halle convenientemente disciplinada y bajo el control de la recta razón. Ningún hombre normal está obligado a practicar abstinencia completa o absoluta en esta materia, pero todo hombre aún después de haber contraído matrimonio, debe practicar un cierto grado de control sobre esta pasión. Mucha miseria física podría evitarse con solo entrar en el estado de matrimonio después de haber practicado una selección racional y con un dominio más perfecto de la pasión sexual.

Por tanto la educación *eugenésica* no es sinó un aspecto de la educación *moral* de la juventud. La educación eugenésica así entendida llegaría en un futuro más o menos lejano, a limitar el número de uniones indeseables desde el punto de vista racial, y a multiplicar los puntos de partida de las líneas sanas deseables.

El desarrollo de estas líneas sanas, deseables, requiere, como hemos dejado escrito, un terreno o atmósfera o medio ambiente favorables. Ciertamente las condiciones económico-sociales y sobre todo, las condiciones morales de la sociedad moderna son las *más desfavorables* que darse pueden para lograr el objetivo eugenésico. Tal vez, antes que cualquiera otra medida o reforma se debiera emprender una reforma económico-social y, sobre todo, *moral*, como parte de un programa eugenésico.

La educación eugenésica debe de poner de manifiesto el carácter disgenésico del birth-control artificial, y establecer una oposición organizada contra dicha práctica tan propagada como funesta.—Aparte de ser dicha práctica el gran vehículo que trasmite las enfermedades venéreas hasta la vida matrimonial, la influencia del birth-control artificial es *negativa y fatal*, pues se trata de medidas de *pura restricción y sin compensación electiva*.

“Nuestra clase privilegiada, aclaman los propagandistas de medidas contraceptivas, se va reduciendo considerablemente, de una manera verdaderamente alarmante. Los intereses de la civilización piden que se inculque la profilaxis anticoncepcional a los elementos deficientes y defectuosos de la población que manifiesta mayor fecundidad, cuando en realidad entre menos tuviese sería mejor.” Este es un razonamiento breve, sí, pero utópico. Para restablecer el equilibrio entre las clases se propone como medio el reducir la fecundidad de las llamadas clases “inferiores”, al mismo tiempo que las llamadas clases “superiores” no se multiplican lo suficiente para mantener la población en un estado siquiera estacionario. Como se ve, en tales circunstancias recomendar las prácticas contraceptivas es sencillamente mejorar la raza haciéndola desaparecer. Afortunadamente la propaganda en favor de las prácticas contraceptivas ha recibido muy poca atención de parte de las llamadas clases “inferiores”, y que forman el grupo del “problema social”. Las investigaciones hechas sobre los resultados obtenidos en las clínicas del birth control artificial muestran que el grupo men-

cionado es el único no contagiado hasta el presente, en número considerable, por esa propaganda subversiva, y sigue con su fecundidad "intempestiva"... Es cierto que la propaganda extensa e intensa llevada a cabo durante los últimos años empieza ya a tocar las *fuerzas vivas* de la nación—las capas sociales medias compuestas de labradores, artesanos, y gente rural, la fecundidad generosa de las cuales asegura hasta el presente la regeneración incesante y salvadora de las clases superiores. Pero en ésto precisamente se muestra altamente disgenésica dicha propaganda anticoncepcionista, puesto que las estadísticas muestran que el número de hijos por familia en estas capas sociales mal llamadas inferiores y que constituyen el 80% de la población tiende a juntarse al de las llamadas clases superiores, conservándolas, renovándolas...

Los anormales, los defectuosos mentales de todas clases siguen reproduciéndose suficientemente de suerte que su proporción en el seno de la población total aumenta, ésto sin que su fecundidad real alcance las cifras con frecuencia muy exageradas y que pasan por exactísimas.

Esto es grandemente inquietante, pues un muy sencillo cálculo evidencia que un ligero desequilibrio en el porcentaje de dos grupos de seres en una población dada, al fin de algunas generaciones se convierte en un enorme desequilibrio en sus proporciones respectivas.

Como conclusión tenemos que el peligro que los anormales representan para el futuro de la raza, razonamiento con que se pretende justificar la práctica de una medida notablemente disgenésica, cual es el birth-control artificial, no proviene hablando con exactitud, de la fecundidad excesiva de dichos anormales, sinó más bien que está provocado ese peligro *por el bajo tanto por ciento de nacimientos en las líneas superiores y sanas.* (29)

El verdadero eugenismo debe ser *positivo*, es decir la preocupación principal del eugenista no debe ser el *destruir*, y ni aún el *eliminar* los defectuosos, sinó más bien el sanear las clases malsanas, y el *aumentar la fecundidad real de las clases sanas*, pues como acabamos de decir con el Dr. R. de Guchteneere el peligro que los anormales representan para el futuro de la raza proviene no de su considerable fecundidad, con frecuencia exagerada, sinó de que las líneas sanas no se multiplican en la debida proporción. Por otra parte es manifiesto que las medidas *puramente negativas* no pueden dar sinó resultados muy limitados, y cuyo aparente buen resultado es contrarrestado y aún excedido por el mal que dichas medidas negativas inseparablemente llevan consigo en su aplicación al hombre. Olvida, por último, el eugenismo negativo que el origen de los defectos y anormalidades en cuestión no se debe buscar solamente en una herencia defectuosa, sinó también y *principal-*

(29) Cfr. "A propos de la Loi allemande sur la Sterilisation" por le Dr. R. de Guchteneere.—*Saint Luc Médical*, Anno XIV, N. 1, 1936, pp. 30 ss.

mente en la inmoralidad en sus múltiples formas. De aquí que el verdadero eugenismo deba ser, ante todo, positivo.

Otra característica del verdadero eugenismo es su carácter *comprensivo*.—El problema eugenésico es un problema bien complejo, sin duda: él es a la vez un problema *biológico, médico, económico-social* y sobre todo un problema *moral*. Ahora bien; la solución de un problema de esta naturaleza<sup>3</sup> si ha de ser completa y satisfactoria, debe de hacer uso de todos los factores que en ese múltiple campo puede encontrar, siempre que sean moralmente lícitos. El eugenista moderno ha caído en el peligro en que está expuesto a caer todo *especialista*, del cual dice De Hovre: “el hombre de una sola especialidad fácilmente se convierte en el hombre de un solo método, de una sola opinión, de un solo punto de vista, en una palabra, fácilmente se convierte en un hombre *unilateral*. Así tenemos que con relativa facilidad se convierte uno en erudito, y tal vez, en un gran especialista, pero queda el peligro de que uno no adquiera una *formación armónica*, y de que todo se convierte en una *... incomparable ignorancia*.” (30) Por carecer de este carácter de *comprensividad* el eugenismo moderno es altamente ineficiente en la solución del problema que le ocupa por tantos años...

Otra característica del verdadero eugenismo es el ser humano, ésto en un doble sentido: en cuanto se *adapta a la naturaleza humana* y en cuanto está *exempto de medidas crueles*.

*Adaptación a la naturaleza humana.* Siendo el hombre un compuesto de alma y cuerpo, el orden esencial de las cosas, la esencia misma del hombre requiere el que el alma mantenga una supremacía real sobre el cuerpo: la supremacía de lo espiritual. El verdadero eugenismo debe de procurar el acrecentar el valor de todo el compuesto humano, en la debida proporción de sus partes; debe de procurar el acrecentar el valor humano y por tanto, el valor físico ciertamente, pero también y más aún el valor *intelectual* y sobre todo su valor verdaderamente humano, *el valor moral*. Reconociendo esta jerarquía de valores, el eugenista digno de este nombre no puede sacrificar valores del orden intelectual, y menos del orden moral por los ínfimos valores que existen en el hombre, los valores físicos. Obrar de otro modo es verdaderamente *inhumano*, si hemos de dar a la palabra su verdadero significado.

*Exempción de crueldad.* Por lo que dejamos dicho al rechazar algunas de las prácticas del moderno movimiento eugenésico, aparece claramente la verdad de nuestra afirmación. La Iglesia Católica no está por medidas *violentas* en esta materia,

(30) “L’homme d’une seule specialite devient facilment l’homme d’une seule methode, d’une seule opinion, d’un seul point de vue, bref, devient facilement un homme *unilateral*. Ainsi on devient aisement erudit, peut-etre un grand specialiste, mais il reste le danger que l’on n’acquiert pas une formation harmonique, et que tout se résume en une... “incomparable ignorance”. Cfr Op. c. (18).

que por una parte, no dan resultados permanentes, y por otra, despojan al individuo innecesariamente de sus más sagrados derechos. El verdadero eugenismo no se hace ilusiones sobre los deseados resultados sorprendentes de medidas drásticas en esta materia; consciente de los resortes que pueden hacer mover al hombre, la Iglesia Católica insiste en que es dado esperar mejores resultados de una sana educación que ilustra la mente y fortalece la voluntad con todos los medios a su alcance.

Se nos dirá que el hombre merece en algunos casos el ser tratado no como tal, sino como un ser irracional... No negamos existan casos y por desgracia muy numerosos en que la degradación reduce al hombre a una condición tal que más que un tratamiento humano debe de administrársele el que es propio de los seres inferiores: pero aún en esto hay un cierto límite, y no obstante la *intensidad* del defecto en el sujeto humano, a no ser que junto con el defecto vayan crímines que le sean justamente imputables, no se pueden ignorar ciertos derechos esenciales a todo hombre, y proceder a imponerle castigos que desdican de cualquier hombre (31).

Por último, el verdadero eugenismo debe de ser ante todo y sobre todo moral, tanto en el ideal que persigue como en todos y cada uno de los medios de que se vale para obtener su ideal.

El ideal que el eugenista debe de perseguir es el *acrecentar* el valor *humano*, mediante el desarrollo y perfeccionamiento armónico y proporcional de los múltiples factores que lo integran,—los factores físico, intelectual y moral (32).

*Moral* en cuanto a los *medios* de que hace uso.—Para una gran mayoría de escritores sobre esta materia, *moralidad católica* ha venido a ser sinónima de una moral de *supresiones y represiones* de impulsos de todo género impuestas por un código una palabra, en la mente y obras de dichos escritores ha venido de leyes tan voluminoso como imposible. La moral católica, en a ser una *moral negativa*, que hace la vida y su desarrollo normal una imposibilidad en el orden práctico y en lo humano...

No es de este lugar el corregir todos estos falsos conceptos, pero si es preciso afirmar aunque sea de paso que semejante inexactitud, o más bien error, solo es concebible en un siglo que si es grande en más de un concepto es barbaramente grande por su ignorancia de lo divino,—cualquiera que sea su conocimiento de lo *humano*.

La ley digna de este nombre no es un obstáculo que haga

(31) Sobre la ayuda que en estos casos puede prestar la sociología puede verse "*La Delincuencia Juvenil*" por Ernesto Nelson.—Espasa-Calpe, Barcelona.—1933; la estructura de la colonia católica de Ursberg, en Barviera, y de la no menos conocida de Gheel para los locos en Bélgica, una descripción de la cual puede verse en *The Month*, February, 1911, y en donde métodos bien humanos han obtenido resultados que nunca podrán obtener medidas drásticas, indignas del hombre, por eficaces que se las quiera suponer.

(32) El tipo de perfección humana y cristiana posible sobre la tierra se halla *realizado* en el Dios-Hombre, Jesucristo. Cfr *Christianity and Race* by Johannes Pinski.—Sheed and Ward.—London, 1936, pp. 20 ss.

imposible el movimiento: la ley dirige la acción por un determinado camino; la ley guía a la inteligencia y mueve a la voluntad de tal modo que la energía humana no se malgaste, sino que se desarrolle convenientemente en la recta dirección y senda que conduce a la tan codiciada, pero frecuentemente ignorada, perfección propia y a la cumbre do hallarse puede la verdadera felicidad, Dios, su Creador y su Fín.

Por lo que se refiere a la 'multitud de leyes que integran la moral católica', este reparo, aún cuando tuviese fundamento, hoy día no tiene sentido cuando nuestros códigos civiles contienen un sin número de leyes sobre materia legislable y no-legislable, muchas de ellas no siendo más que *ingentes iniquidades*, por hallarse en manifiesta oposición no solo con la ley superior positivo-divina, sino con la ley fundamental, en conformidad con la cual debe estar toda ley humana, la *ley natural*, razón por la cual tantas veces hemos calificado varias de las medidas eugénicas, de *inmorales*. Sobre esta ley, la ley natural, y su extensión al campo eugenésico, nos parece necesario extendernos un poco.

Desde la eternidad existe en la mente de Dios la *idea* del mundo, que El libremente quiso crear, así como también existe en esa misma mente el *plan* de gobierno en conformidad con el cual Dios determinó regir el mundo y dirigirle a su fin. Dios quiere por tanto obligar a todas las criaturas a que tomen cierto curso de acción, en conformidad con la naturaleza que El les ha dado. Habiendo decretado desde la eternidad el crear al mundo El quiso a la vez también este orden y curso de acción. Ahora bien, esta voluntad de Dios, de que todas las criaturas así obrasen, este decreto existente en la mente divina desde toda la eternidad, y dependiente de la naturaleza y relaciones esenciales entre ellas y con su principio, es llamado *Ley Eterna*, y la cual podríamos brevemente definir—*el plan de gobierno en la mente de Dios, según el cual El ha decretado desde la eternidad el guiar a todas las cosas y el dirigir las a su destino final—la gloria eterna de Dios y la eterna felicidad del hombre.*

La existencia de un *tal plan* en la mente divina, según el cual El rige, guía y gobierna todas sus criaturas a sus respectivos fines es poco menos que evidente. Así como en todo artífice, escribe Santo Tomás, pre-existe el plan de las cosas que por medio del arte construye, así también en todo gobernante debe pre-existir el plan del orden de las cosas que han de ser llevadas a cabo por aquellos que están sujetos a su gobierno. Y así como el plan de las cosas que han de ser hechas mediante el arte y que existe en la mente del artífice se llama *ejemplar*, así el plan de aquel que gobierna tiene el carácter de *ley*, si por otra parte cumple con las demás condiciones comunes a toda ley,—ordenación de la razón y para el bien de la comunidad perfecta para la cual la ley es dada. Ahora bien, Dios es el Creador de todas las cosas y con respecto a ellas se ha como el artífice con respecto al producto de su arte. El es también el *gobernador de*

todos los actos y movimientos que se hallan en las criaturas. Y como el plan de la divina sabiduría reviste el carácter de *ejemplar o idea*, en cuanto que conforme a él todas las cosas han sido creadas, así el plan de la divina sabiduría en cuanto guía, dirige y mueve todas las cosas al fin tiene el carácter de *ley*, que por existir en la mente divina, desde la eternidad, se denomina *eterna* (33).

Esta ley a fin de que sea *operativa y eficiente* como una norma de acción para las cosas creadas, es necesario que en algún modo sea *comunicada y promulgada* a las criaturas mismas. Esta *comunicación, promulgada de la ley eterna a la criatura*, es lo que llamamos *ley natural*, cuyo modo de comunicarse y promulgarse al hombre vamos a exponer brevemente.

La ley en cuanto medida y regla de acción puede existir de dos modos: *en la persona que gobierna, o esencialmente, y en la persona gobernada o por participación*. Como la ley sea la regla y norma propia del acto humano, el cual es regulado mediante el conocimiento, síguese que toda participación o comunicación de la ley debe de tener lugar mediante el conocimiento.

Afirmamos pues que en el hombre se dá una *participación cognoscitiva natural de la ley eterna*, a la que llamamos *ley natural*. Es una *participación cognoscitiva, natural*, en cuanto que el conocimiento de la ley eterna en el hombre se obtiene mediante la naturaleza, o en cuanto que el hombre conociendo su propia naturaleza, su mente asciende y llega al conocimiento de la ley eterna. En efecto, el hombre, por medio de sus inclinaciones o tendencias o apetitos *naturales* viene en conocimiento de la voluntad y orden divinos, toda vez que dichas tendencias, inclinaciones o apetitos son la misma ley eterna *pasivamente* considerada, o en el sujeto gobernado, una como *impresión* permanente de la ordenación y ley eterna divina, algo así como la dirección que imprime el arquero a la flecha; es expresión de la dirección u ordenación que existe en su mente, con la diferencia, entre otras, que esta dirección es transeunte o pasajera, y aquella permanente, como su misma naturaleza. Este es el alto valor y significado de las inclinaciones, tendencias o apetitos naturales: ellos son un *reflejo y como expresión de la voluntad, ordenación y ley eterna, ley divina*.

Santo Tomás define la ley natural diciendo que "*es un concepto o conocimiento naturalmente impreso en la mente del hombre, en virtud del cual concepto o conocimiento el hombre se dirige convenientemente en sus acciones propias, tanto en las que le son propias en virtud de su elemento genérico, o en cuanto animal, como en aquellas otras que le son propias en virtud de su naturaleza específica o racional*" (34). Al decir Santo Tomás que la ley natural es un concepto o conocimiento *naturalmente impreso* en la mente del hombre, no quiere afirmar, observa J. Gredt, que se den ideas innatas, sinó que meramente afirma la

(33) I II 93. 1; ib. q. 1. 1.

(34) Suppl. q. 65. a. 1.

existencia innata en el hombre de una inclinación y de una facilidad espontánea, no bien llega al uso de la razón, para abstraer de las cosas sensibles las nociones comunísimas del orden práctico—como es, por ejemplo, la noción del bien y del mal—y después formular con esas nociones comunísimas los principios más universales del orden práctico, *los primeros principios de la ley natural. Los preceptos de la ley natural son por tanto aquellas ordenaciones que espontáneamente forma la mente y por las que se rigen las tendencias naturales, ordenaciones que mandan o prescriben aquellas acciones conformes a la inclinación natural, buenas de suyo, y que son necesarias para obtener el fin o bien, objeto de la inclinación natural, si este fin o bien—objeto debe ser obtenido; y prohíben a su vez aquellas otras acciones disconformes a la inclinación natural, malas de suyo, y que impiden o hacen difícil la consecución del fin, bien, objeto, término de la inclinación natural* (35).

Manifiéstase la ley natural, según dejamos dicho, mediante la inclinación natural, y promúlgase en cuanto que el hombre conoce sus inclinaciones naturales, expresión de la divina voluntad y ley eterna. De aquí concluye Santo Tomas “el orden de los preceptos de la natural es según el orden de las inclinaciones naturales.” (36).

Como la inclinación sigue al ser, y en el hombre se pueda distinguir un triple ser—el de *substancia*, el de *animal*, y el de *ser racional*, de aquí la triple inclinación natural existente en el hombre, y que puede formularse así:

- 1a. tendencia natural a preservar su existencia individual y los bienes que sobre ella dependen—en cuanto que es **ser substancia**;
- 2a. tendencia natural a preservar la existencia de la especie humana y los bienes inherentes—o en cuanto **ser animal**;
- 3a. tendencia natural a desarrollar sus habilidades innatas, en particular, las mentales, mediante la sociedad de sus semejantes—o en cuanto **ser racional**.

Las tendencias, inclinaciones o apetitos naturales difieren no solamente en sus fines, sinó también en el modo en el cual ellas dirijen o guían a sus respectivos fines o términos. En las plantas, los apetitos naturales toman la forma de fuerzas vitales irresistibles, que impelen físicamente a la planta a desarrollarse en una dirección determinada. Los apetitos naturales animales se dejan sentir en forma de impulsos sensitivos o deseos síquicos que dependen de un conocimiento sensitivo. En el hombre, además de estas dos clases, hay apetitos que siguen a la razón. En su ejercicio las inclinaciones o apetitos naturales en el hombre están sometidos al control de la recta razón. Al igual que los apetitos, los preceptos de la ley natural que sobre ellos se basan, difieren grandemente en el modo en el que ellos guían a los seres a sus fines. Sin embargo, en el hombre la mayor

(35) Cfr. *Elementa Philosophiae Arist.—Thomisticae* auctore J. Gredt, O. S. B.—Ed. 4a. 1926—Vol. II, no. 939.

(36) Cfr. I II q. 94. a. 2, c.



parte de los apetitos naturales están bajo el control de la razón, y como consecuencia, es más bien por la razón que los hombres son *directamente* gobernados que por los apetitos naturales, de aquí el que se haga necesario hablar de la ley natural en el hombre, por lo que se refiere a los actos deliberados, como de una ley de la razón.

De lo que llevamos dicho, sobre los preceptos de la ley natural alguno pudiera inferir que el hombre está obligado a conseguir los fines de todos los apetitos naturales, lo cual no es verdad. Pues en primer lugar nadie podría conseguirlos todos; y en segundo lugar, los intereses de un apetito o inclinación natural están frecuentemente en oposición en algún modo con los intereses de otros, de donde se sigue que ambos no pueden obtenerse. Así por ejemplo, el matrimonio y los deberes de un soldado son algunas veces incompatibles. Pertenece a la razón el determinar en cada caso particular lo que es mejor para el individuo, el principio general de la recta razón *dictando solamente* que cada individuo debe obtener los fines que pertenecen a la vida y perfección del individuo, mientras que los deberes que pertenecen a la vida y perfección de la razón recaen más que sobre el individuo sobre la especie. (37).

Las tendencias, inclinaciones o apetitos naturales se determinan, concretizan y realizan en *facultades* o *potencias*, de tal modo que a la tendencia natural corresponde una facultad o potencia que se especifica por su objeto directo o término. De estas facultades o potencias vale, en general, lo que llevamos dicho de las inclinaciones naturales. El orden natural de las facultades o potencias depende del orden natural y entre las diversas facultades existe un cierto orden natural. Este orden natural es un orden de *mayor y menor*, i.e. de mayor o menor amplitud del objeto que la facultad abarca. Así el objeto de la facultad vegetativa es un objeto relativamente limitado—usando la frase de Santo Tomás 'corpus proprium'. El objeto de la facultad sensitiva es mucho más amplio: él abarca todo aquello que pertenece al mundo sensible y está presente a nosotros y es cognoscible. Aún más amplio es el objeto del entendimiento que abarca todo el mundo, presente, pasado y futuro, material e inmaterial. Esta diferencia en la amplitud del objeto abarcado por las facultades establece entre dichas facultades ciertas relaciones de supremacía y de inferioridad, y hace de ellas un orden jerárquico correspondiente a la jerarquía natural de los fines a los que esas facultades sirven. Entre los apetitos el inferior es el vegetativo, el siguiente el sensitivo; el superior es la voluntad. Como es fácil ver, en el hombre la más alta de las facultades está construida sobre la inferior—la sensitiva sobre la vegetativa, la racional sobre la sensitiva, del mismo modo que una casa está edificada sobre sus fundamentos y el piso más alto sobre el inferior. Y así como los fundamentos pueden considerarse como

(37) Cfr. **La Procreation et la Sterilisation** par A. Martin de Sobradillo, O. M. C. Paris, 1932.—P. I.: Du Droit a la procreation: pp. 3-75.  
Cfr. S. Tomas, III C. G. c. 136.

medios y la casa' como fin, del mismo modo, la facultad inferior puede considerarse como medio con respecto a la facultad superior.

Dejando a un lado la cuestión del valor de un apetito o facultad sensitiva comparado con otra, comparando solamente todo el grupo vegetativo con el sensitivo, y estos dos con el apetito racional, es manifiesto que el grupo de menor amplitud está naturalmente sub-ordinado al que es de mayor amplitud, mientras que todas las facultades, cualquiera que sean sus objetos, están subordinadas al bien de *todo el hombre*. Consiguientemente, así como en todo organismo, cada parte tiene su propio fin distinto del fin de las otras partes, y como el fin de cada parte está subordinada al fin del todo, así también toda facultad tiene su propio fin u objeto, pero está subordinada a la facultad que es más amplia y que la contiene, y a todo el organismo, toda vez que el fin del organismo contiene el fin de cada parte. De estas relaciones se derivan las *leyes de los organismos*. Y estas leyes dan origen a *preceptos morales*. Pues así como en una máquina, sería una acción irracional el usar la tuerca con detrimento del eje, al que la tuerca debe conservar en su lugar, de semejante manera, sería anti-natural el usar una facultad vegetativa o sensitiva para la destrucción del entendimiento, y aniquilar el entendimiento a fin de satisfacer con un pasajero gozo las facultades inferiores (38).

Es un hecho de experiencia que el ejercicio de toda potencia o facultad va acompañado y seguido inseparablemente de una cierta *delectación*, cuya naturaleza específica depende de la naturaleza de la potencia o facultad, y cuanto mayor es el bien que debe obtenerse mediante el ejercicio normal de una potencia o facultad tanto más intenso es la delectación que se experimenta en el ejercicio de la facultad o potencia.

Santo Tomás en sus Comentarios al X Libro de los Eticos de Aristóteles se ocupa por extenso de esta cuestión, cuya doctrina es una condenación de muchas bárbaras prácticas modernas. Entre los efectos que, basado en la más sencilla observación, el Doctor Angélico atribuye a la mencionada delectación se halla "el confirmar la acción de la que es efecto la delectación, de tal modo que el hombre ejercite esa operación con más interés." La delectación de que hablamos sirve para regular y asegurar el ejercicio de la potencia o facultad, la cual ciertamente muchas veces no se ejercitaría, aún cuando fuese necesaria, a no ser por la concomitante y subsiguiente delectación. Tiene pues el valor de un *estímulo* en orden a la respectiva operación. Como quien preveía la mentalidad y prácticas de hoy día, el Aquinatense se pregunta—si los hombres desean o apetecen la vida por la delectación, o viceversa la delectación por la vida. En otros términos: el hombre siente una tendencia na-

(38) **The Science of Ethics** by Rt. Rev. Mgr. M. Cronin, M. A., D. D., P.P.—New York—1930—Vol. I: pp. 137-138 and passim.

tural a conservar su vida, a la cual tendencia natural corresponde la facultad en virtud de la cual toma el propio alimento, mediante el cual ejercicio o acción el hombre preserva su existencia o vida. En el ejercicio de esta facultad se experimenta la correspondiente delectación. Ahora bien: la operación de tomar alimento y la consiguiente conservación de la vida tienen por fin la delectación que acompaña y sigue a la operación de tomar el propio alimento o habrá que decir que la *delectación* se ordena como a su fin a la operación de comer y conservar la vida, teniendo así el valor de *medio*? Aristóteles no cree oportuno dar respuesta a esta duda, por la sencilla razón de que estas dos cosas van de tal modo unidas que de ningún modo se separan. Así, prosigue Santo Tomás, no tiene lugar la delectación sin la operación, ni puede darse una operación perfecta sin la correspondiente delectación. Es sin embargo más importante la operación que la correspondiente delectación, pues la delectación es el descanso del apetito en la cosa que causa la delectación y la que se obtiene mediante la operación. Así nadie apetece el descansar en algo sinó en cuanto lo juzga conveniente para sí. Por tanto la operación que deleita en cuanto que es algo conveniente, parece ser principalmente y más deseable que la delectación (39). Podríamos decir, resumiendo esta doctrina en un ejemplo, que el *comer* y la vida no se ordenan a la delectación correspondiente, como a fin, sinó que la delectación se ordena *a manera de medio a fin* a la operación, a comer, y últimamente a la vida, su conservación. Las consecuencias de esta doctrina son tan obvias como importantes, especialmente por lo que se refiere a la facultad de la *reproducción*.

Resumiendo y aplicando la precedente doctrina sobre la ley natural y notando su aplicación al eugenismo, tenemos que:

1. existe en el hombre una participación cognoscitiva, natural de la ley eterna, que llamamos ley natural, que se manifiesta a través de

(39) "Potest ergo dubitatio esse, utrum homines appetant vitam propter delectationem, vel e converso delectationem propter vitam.

Et dicit, quod dubitatio dimittenda est ad praesens: quia ista duo ita coniunguntur adinvicem, quod nullo modo separantur. Non enim fit delectatio sine operatione, neque rursus potest esse perfecta operatio sine delectatione, ut dictum est. Videtur autem principalius esse operatio quam delectatio. Nam delectatio est quies appetitus in re delectante qua quis per operationem potitur. Non autem aliquis appetit quietem in aliquo nisi in quantum aestimat sibi conveniens. Et ideo ipsa operatio quae delectat sicut quoddam conveniens, videtur per prius appetibilis, quam delectatio."

In **X Ethicorum**, lect. VI. nos. 2037. 2038—Editio noviss., cura ac studio P. Fr. A. Pirotta, O.P.—Taurini, 1934: p. 647.

La cuestión del placer o deleite que acompaña y sigue la operación está ampliamente tratada en los cc. IV y V, lecciones VI y VII del libro X de los *Éticos* de Aristóteles y en la I II qq. 31-34.

Sto. Tomás trata de la ley natural principalmente la I II 9. 91, a. 2; qq. 93. 94; III C. G. cc. 122-125, 129, 136; in IV Sent. d. 33, q. 1.; in III Sent. d. 37, q. 1.—Dom Odon Lottin, O.S.B., en su obra "Le Droit Naturel chez St. Thomas d'Aquin (Bruges, Belgium. Ed. 2me 1931) aclara la terminología del Santo Doctor en algunos puntos.

las inclinaciones, tendencias o apetitos naturales o estrictamente innatos, siendo esta ley natural superior e independiente de toda autoridad humana.

2. La naturaleza nunca tiende a su destrucción, de donde todo acto que elevado a la categoría de principio general de acción resultaría nocivo a la especie humana, en virtud de su carácter específico, es malo intrínsecamente, antinatural, aún cuando en algún caso particular los malos efectos contra la naturaleza no se siguiesen de hecho. La perfección del hombre está en la dirección positiva que marcan las inclinaciones naturales y no en ir contra ellas. La finalidad del precepto negativo de la ley natural tiene una finalidad, en último término, positiva.
3. La ley natural comprende aquellas ordenaciones que espontáneamente forma la mente y por las que se rigen las tendencias naturales, ordenaciones que mandan o prescriben aquellas acciones conformes a la inclinación natural, buenas de suyo, y que son necesarias para obtener el fin o bien-objeto de la inclinación natural—si este fin o bien—objeto **deben** ser obtenidos; y prohíben a su vez aquellas otras acciones disconformes a la inclinación natural, malas de suyo, y que impiden o hacen difícil la consecución del fin, bien—objeto de la inclinación natural.
4. Los varios preceptos de la ley natural dan origen a los llamados derechos naturales: a la existencia, a la integridad corporal, en cuanto **ser substancia** y en virtud de la correspondiente inclinación y precepto; al matrimonio, a la procreación, y educación de los hijos,—en cuanto **ser animal** y en virtud de la correspondiente inclinación natural y precepto; a vivir en sociedad,—en cuanto **ser racional**, en virtud de la correspondiente inclinación natural y precepto. Existen otros derechos naturales además de estos. Todos ellos, al igual que la ley natural sobre que se basan, lo mismo que los correlativos oficios (officia) u obligaciones son anteriores e independientes del Estado.

Algunos de los mencionados derechos naturales, considerados desde otro punto de vista, son verdaderos **oficios** (officia) u obligaciones—como la de preservar la existencia, la integridad corporal, etc., y de las que el individuo no puede desentenderse.

5. El matrimonio, aún entre no católicos, es independiente en sus elementos esenciales, de la voluntad misma de los contrayentes, mucho más de las leyes del Estado, que le es posterior. Es una institución de derecho natural y que no ha sido instituida por el hombre.
6. El deleite o placer que acompaña y sigue al ejercicio de una facultad es inseparable del objeto primario y directo de la facultad. Perseguir el deleite o placer, a la vez que se excluye el término primario y directo de la acción, es ir contra la naturaleza de las cosas, convirtiendo el fin en medio, y el medio en fin. Esto tiene lugar en el caso de la esterilización eugenésica.
7. Al tratar de perfeccionar al hombre debe de considerarse la naturaleza **humana toda entera**, observando fielmente las leyes de los organismos y respetando escrupulosamente la jerarquía de los verdaderos valores en el hombre, según lo que dejamos expuesto.
8. Todo ideal de perfeccionar al hombre y hacerle feliz debe de tener presente que siendo la vida en la tierra una introducción a la vida futura; un lugar de prueba y de lucha, todo lo que es posible obtener sobre la tierra es una felicidad **incompleta**.

Todo programa eugenésico ha de ser moral, no solo por lo que se refiere al objetivo de la eugenesia, sino también en cuanto a sus medios, para lo que se requiere que esos medios estén en plena conformidad con los preceptos *inmutables*, siempre modernos y de actualidad, y *universales*, de la ley natural, norma preceptiva fundamental de la moralidad digna de tal nombre.

# PHILOSOPHY AND HISTORY

## Education Under Three Regimes

By Dr. Eufronio M. Alip

*A Brief Dissertation on the Development of Education  
in the Philippines During the Spanish, Filipino,  
and American Regimes*

### INTRODUCTION

Some of our writers and thinkers have, from time to time, asserted that "the education in the Philippine during the Spanish regime began on top and ended at the bottom." Similar writers in vitriolic language have blamed the Spanish regime for being too antiquated in its educational methods and policies and consequently brought to the country no system of popular and public education. They blamed the Spanish friars for being too ignorant and bigoted.

Anti-Filipino writers have pictured a gloomy aspect of Filipino life in the realm of education and social and intellectual pursuits. They pictured these people as "incapable of progress." Some of them even believed that the Filipinos are fit to be nothing but serfs and slaves that must always go with the "carabao, their inseparable companion."

Modern writers extoll to the heights of Olympus the American system of education as introduced into the Philippines. A few of them do not even give credit to the contributions of the Filipino people in the realm of education and intellectual advancement of the race, by simply ascribing our progress to the very beneficent works of the Spaniards and the Americans.

The present article presents the subject of our educational development under the Filipino, the Spanish and the American regimes to show that many of the opinions advanced by some of our commentators are both misleading and fallacious and the product of either ignorance or misinformation of the real situation.

**Editor's Note:** This is one of the chapters of a new book, "Philippine History and Government," written by the author. This new book, which is divided into ten units and forty chapters, follows the Morrison Unit Plan now used in the Philippine public schools.)

*Education at the Time of Conquest*

For lack of sufficient materials, we have a hazy or obscure idea of the education of the early Filipinos, we do not know exactly what subjects were taught to the children, what preparations were needed of the teachers, what methods they used, and what materials of instruction they had. There were early Spanish writers, however, who hinted that at the time of the conquest these people must have had a regular system of education. Father Chirino, for instance, tells us that the natives were "much given to reading and writing" and that there was "hardly a man, and much less a woman, who does (did) not read and write in the letters used in the island (city) of Manila..."<sup>1</sup> Morga testifies, likewise, that almost all the natives knew how to read and write correctly and excellently in the native language.<sup>2</sup> Other writers believed that there were regular schools which taught reading, writing, arithmetic, religion, the art of warfare, farming, cooking, poultry, weaving, and sewing.<sup>3</sup>

*During the Spanish Regime*

*The Missionaries as Teachers.*—During the Spanish regime the education of the people was under the control, or with the permission and supervision, of the Catholic Church. Following the system used even in Europe, the government of the country did not directly concern itself with education. For in accordance with the educational principles in vogue then, education was the primary concern of the Church.

Soon after the occupation of the Islands, the missionaries penetrated the Philippines and wilderness not only to spread the Faith, but also to teach the people reading, writing, arithmetic, music, and deportment. In towns and villages they at once built *visitas*, or temporary sheds, to conduct catechism and to teach the young boys and young girls the three fundamentals. The early missionaries of the five religious orders really spared no efforts in providing primary instruction to the children. We can still picture in our minds such men as Fathers Urdaneta, Rada, Plasencia, Benavides, and Chirino amidst group of boys and girls teaching them not only to be good Christians but also to be assiduous in everything. The missionaries were also responsible for the establishment of higher schools for boys and girls in Manila and in other thickly populated places.

*The Encomenderos and the Parochial Schools.*—Some royal orders that came from Spain dealt with the educational affairs of the country. These included the teaching of the Spanish language, the building of school-houses, compulsory at-

(1) Blair and Robertson, **The Philippine Islands.**

(2) *Ibid.* vol. 16, pp. 116-117.

(3) Josue Soncuya, **Historia Prehispana de la Isla de Panay**, Manila, 1917, pp. 22-24.

tendance of school children, and the support of education. One of the orders referred to the obligation of the encomendero, to provide for the education of the parishioners who lived in his *encomienda*. Many encomenderos, like Salcedo and Loarca, followed the laws and really did good work for the extension of Christianity and education to the people. But on the whole there were more bad encomenderos who dreamed only of enriching themselves, and consequently paid no attention in performing their obligations. As a result of the latter condition, Governor Gomez Perez Dasmariñas, in 1591, ordered the encomenderos to appropriate a certain fixed amount for school purposes. In the schools of the encomenderos, the missionaries taught the pupils without compensation, and the pupils enrolled in these schools without paying anything. In other words there was free education. With the abolition of the *encomienda* system and the passing of the encomenderos, the missionaries were left alone in the work of education.

*Methods Employed; Subjects Taught.*—Believing that the work of conversion and education could be done easier and faster by the use of the native language, rather than Spanish, the missionary-teachers undertook to study the languages of the people and in these languages they taught the natives. They also introduced the Roman alphabet and ignored the cumbersome native character. They prepared books, pamphlets, and other materials to be used in the classes. Because of the small number of missionaries available, and the multiplicity of their work, it was deemed proper to secure the services of the pupils who were advanced in their studies to teach those who were in the lower grades. The catechetical method and the monitorial system were used.

The subjects taught were, according to Morga, religion, Spanish (in higher grades), reading, writing, and music. The boys were also taught "to serve in the church, to sing the plain-song and to the accompaniment of the organ; to play the flute, to dance, and to sing; and to play the harp, guitar, and other instruments."<sup>4</sup> The missionary-teachers also introduced improvements in the cultivation of rice, "brought Indian corn and cacao from America and developed the cultivation of indigo and coffee, and sugar cane."<sup>5</sup>

The instruction given by these missionaries was so effective that not long after the implantation of the Spanish rule, Spanish writers could say with pride that the Filipinos forgot their native alphabet and learned to read and write in the Spanish way, and that a few of them became clerks, secretaries, printers, and even officials. During his time (about 1600) Father Chirino claimed that he could not find any Filipino who could not read and write.

*Difficulties Met by the Missionary-Teachers.*—Six princi-

<sup>(4)</sup> Blair and Robertson, op. cit., vol. 16, p. 152.

<sup>(5)</sup> Ibid., vol. 1, p. 42.

pal difficulties met the zealous endeavours of the missionary-teachers. They were the lack of teachers, lack of funds, lack of materials, lack of school houses, poor communication and multiplicity of their work. In an archipelago of half a million inhabitants distributed in many islands (there are about 7,000 islands and islets) the presence of about 150 missionary-teachers (during the early years of the occupation) to instruct the inhabitants in many ways of living is almost a mockery, yet that was the real condition in the country. For lack of well-instructed and well-trained teachers, assistants who could hardly read and write were hired. The missionaries, moreover, had to do various work other than teaching, for indeed they were the architects, the farmers, the artisans, the soldiers, and the builders.

An equally difficult plight was the lack of funds. The government did not have sufficient money to support the education of the people, or if it had some, its system of budgetting was so poor that education was almost wholly neglected. During that time, too, materials for school purposes were very insufficient. There were few books and few writing materials. At the beginning, these had to be brought either from Spain or from Mexico. After the introduction of the printing press here, some of these materials were printed here, still they were not sufficient to satisfy the needs of the schools. School houses were also very few, and most of them were built of poor materials. It was not until later when school houses of strong materials were available. Lastly, travel was difficult because of poor roads, or no roads at all. Transporting materials was naturally difficult. Children of advanced training could not go to other places where advanced classes were given. Going to Manila or to any other center of learning needed much time and much money. Really only the great zeal of the missionary-teachers overcame many of these difficulties and brought about the educational advancement of the country.

*Higher Schools for Boys.*—The activities of the missionaries were also felt in the establishment of higher schools for boys. The Jesuits and the Dominicans were specially the ones who paid great attention along this line. The Jesuits founded the College of San Ignacio, College of San Felipe, College of San Ildefonso, and the College of San Jose. The Dominicans established the University of Santo Tomas, and the College of San Juan de Letran.

*The Colleges of the Jesuits.*—The Jesuits in the Philippines have gained a name as great educators. They were great educators during the early years of the conquest as they are great educators now. The first college they founded was the *College of San Ignacio* (1589) in honor of the founder of the Jesuit society. It was opened both for secondary students and those who wanted to be priests. It gave courses in theology, canon law, civil law, philosophy, Latin and rhetoric. The college was



supported by royal grants, private donations, and by the Society itself. Both the Pope and the Spanish king granted it the permission to grant academic degrees, the first in 1621 and the second in 1622. It lasted until the expulsion of the Jesuits from the country in 1768. Its first rector was Father Antonio Sedeño, who was a great architect and builder.

With Father Pedro Chirino, champion of the Filipinos as its first rector, the *College of San Ildefonso* in Cebu was founded by the Jesuits in 1599. The nature of this college was similar to the College of San Ignacio: in matters of its support, studies, and administration. It did not last long.

*The College of San Jose* which was formally founded in 1601 through the efforts of Father Diego Garcia was another school of higher learning founded by the Jesuits. It was primarily a seminary for the training of boys who desired to be priests. When the Jesuits were expelled, it came at first under the control of the government which soon handed it over to the Dominicans. Under the administration of the latter, it became a school for medicine and pharmacy, of the University of Santo Tomas. When it was returned to the Jesuits later, it became again a seminary. Now it is still owned and operated by the Jesuits. It is an interdiocesan seminary.

Another college founded by the Jesuits was the *College of San Felipe* which was founded in Manila in 1640 but closed a few years later.

*University of Santo Tomas.*—The Dominicans in the Philippines, like the Jesuits, have curbed a niche in the hall of fame as great educators. The first two schools which they founded in Manila were the University of Santo Tomas and the College of San Juan de Letran. In later years they also established schools in Pangasinan and Cagayan.

The University of Santo Tomas was founded in 1611 through the donations of Archbishop Miguel de Benavides, an outstanding educator and champion of the Filipinos. Its first rector was Father Fr. Baltazar Fort.<sup>6</sup> At first it was named Colegio de Nuestra Señora del Rosario, and later as Colegio de Santo Tomas. It was made a university in 1645. It was conceded the name "Royal University" by Charles IV in 1785, and "Pontifical" in 1902. Today it is the only Pontifical University in the Far East and the oldest university under the American flag. Since the fall of the Spanish monarchy a few years ago, it dropped out its name of "Royal."

The early courses given were grammar, arts, theology, logic, philosophy, canon law, civil law, and late in the 19th century it added medicine, pharmacy, midwifery, and dentistry. Lately more improvements were made.

<sup>(6)</sup> Juan Sanchez, O.P., *Historical Documentary Synopsis of the University of Santo Tomas of Manila*, 1929. English translation was made by Dr. James Bass.

*San Juan de Letran College.*—The San Juan de Letran College was founded by Juan Geronimo Guerrero and Fr. Diego de Santa Maria.<sup>7</sup> It was the product of the fusion of two schools: a school for orphans established by the former in 1620 and the Colegio de San Pedro y San Pablo by the latter. In 1630, which is oftentimes referred to as the date of the foundation of the College, the school for orphans of Guerrero assumed the name of Colegio de San Juan de Letran, after it had been granted some property by Governor Sebastian Hurtado de Corcuera. The fusion of the two schools took place in 1630. Now it is known as Colegio de San Juan de Letran. The college has been primarily a secondary school, and now it is the oldest secondary school for boys in the Philippines.

*Schools for Girls.*—Education was not an exclusive acquisition of the boys, for there were also schools for girls in Manila and in the provinces. Those in Manila specially deserve our attention. In all the girls' schools, the subjects given were reading, writing, music, needlework, arithmetic, religion, and deportment. Like the boys, the girls were taught how to sing in the choir.

In Manila there were two general types of girls' schools. They were the *colegios* and the *beaterios*. The first were real schools where academic as well as vocational training was taught, while the second were a sort of orphanage or special houses to take care of the girls and young women who wanted to live in seclusion. Classes were also conducted in the *beaterios*. In Manila there were more *beaterios* than *colegios* during the Spanish regime. Among the *beaterios* were Santa Potenciana (1591), Santa Isabel (1594), Santa Clara Monastery (1621), Santa Catalina (1694), San Sebastian (1719), Santa Rosa (1750), Santa Rita (in Pasig, Rizal, 1740), and Beaterio de la Compañia de Jesus (1694).<sup>8</sup> San Sebastian and Beaterio were founded by Filipino women. The Colegio de Santa Isabel, which still exists today and is located in a three story building in Intramuros, is the oldest school for girls in the Philippines. In later years a few of these schools became *colegios*.

*Introduction of Printing Press.*—What greatly aided the missionaries in their educational activities was the introduction of printing press in the country. As early as 1593 a book entitled *Doctrina Cristiana*, written by Fr. Domingo de Nieva, was printed in Manila in the xylographic character. The first press of the movable type was introduced here in 1602 by Fr. Francisco Blancas de San Jose, O.P., and Juan de Vera, a

(<sup>7</sup>) See Bazaco, E., **History of Letran College**, 1933, for detailed treatment of this subject.

(<sup>8</sup>) Literature on this subject is given by E. Arias, **Memoria Historico Estadística Sobre la Enseñanza Secundaria y superior en Filipinas**; C. Osias, **Education in the Philippines**; E. Alzona, **History of Education in the Philippines**; and E. Bazaco, **History of Education in the Philippines** (Mss.)

Chinese convert. The first shop was established in Binondo where Fr. Blancas de San Jose was the curate. Later it was transferred to Bataan, then to Lāguna, and then to the University of Santo Tomas where it has been housed ever since.<sup>9</sup> Printing press in the Philippines is older than any press in the United States. In this press were printed the greatest bulk of reading materials in the country during the Spanish regime. It is still one of the best in the country.

*The First Books Printed Here.*—The first book printed in that press was "El Libro del Rosario" written by Fr. Blancas de San Jose himself. He was also the author of "Libro de los Sacramentos," "Memorial de la Vida Cristiana," "Arte y Reglas de la lengua Tagala," and various others. Tomas Pinpin and Fernando Bagongbanta, Filipinos, were authors also of some books. Pinpin, together with Fr. Blancas de San Jose, wrote "Librong pagaaralan ng mga Tagalog Uicang Castila" which was printed in 1610. Bagongbanta wrote Tagalog verses. Fr. San Buenaventura wrote a book on Tagalog vocabulary, which was the first book of the kind. Others like Plasencia, Chirino, Lcarca, Morga, and Albuquerque, wrote also books or pamphlets on religion, art, and other topics. Before 1800 there were some 500 different books printed here. These books, together with those brought from Mexico and Spain, greatly aided the missionaries in their work.

*Filipino Printers and Engravers.*—The introduction of printing press in this country taught the Filipinos the art of printing and engraving. The first Filipino to learn printing was Tomas Pinpin, a fact which has earned for him the name of "Prince of Filipino typographers and engravers." Other early Filipino printers and engravers were Nicolas de la Cruz Bagay and Laureano Atlas. The Filipinos learned the art of printing and engraving so well that Father Colin spoke of them with great admiration. He said they were "entirely competent in that work, in which their skill and ability are very evident."<sup>10</sup>

*Libraries and Museums.*—Largely as a result of the introduction of printing press, the country began to build libraries and museums. In this field the missionaries again showed great proficiency. The five religious orders gathered and collected books, antiques, and specimens of natural history and assorted them out into useful libraries and museums. One has just to visit the convents of these orders in Manila to be convinced of the great wealth of materials they have, relating to natural science, history, art, grammar, religion, antiques, botany, education, mechanics, philosophy, and other topics. Many of their books and other reading materials were printed in

(<sup>9</sup>) Read Retana, *La Imprenta en Filipinas*; also E. M. Alip, "The Father of the Philippine Printing Press" in *Unitas*, U.S.T. Faculty Organ, vol. 12, No. 3, Sept., 1933, pp. 189-194.

(<sup>10</sup>) Blair & Robertson, *op. cit.*, vol. 40, p. 52.

the Philippines while not a few came from Mexico, China, Japan, Spain, France, and other countries. Those printed here before 1800 were no less than 500 different works. Papers relating to the Church and the State, documents of great value, letters from one officer to another, decrees and ordinances, and various other state papers relating to the Spanish regime have been safely deposited in these libraries and museums.

### *The Educational Reform of 1863*

*Earlier Attempts at Reforms.*—The most notable step taken by the government to improve the educational system in the Philippines was the promulgation of the Educational Decree on December 20, 1863. This decree revolutionized the system of education in this country. Prior to this year, however, attempts had already been made to secure similar end. Thus, in 1839, Isabella II, queen of Spain, ordered Governor Lardizabal to create a commission to study ways and means to improve the education of the country. Unfortunately, it was not until 1855 when the commission desired was really created by Governor Crespo. This commission, however, did not accomplish much. A similar commission was named by Governor Solano five years later, and another by Governor Lemery in 1861. The last two bodies studied the question of education so well and their recommendations were believed good so that they exercised great influence in the final draft of the reform decree that was issued in 1863.

*Aims of the Reform of 1863.*—The decree had a two-fold aim: (1) to establish a public school system in the Islands and (2) to provide professional training to the teachers. The first aim was to be attained by (a) the establishment of at least one public school in each town (and two or more in bigger towns), (b) by providing for compulsory attendance, (c) by providing for free tuition for the poor, and (d) by providing for the teaching of Spanish, religion, and good deportment. The second aim was to be attained by establishing one normal school for lady teachers and another normal school for male teachers. Government supervision both of the primary and normal schools was provided in the law.

*Separate Classes for Boys and Girls.*—The law provided for the establishment of two elementary schools in each municipality, one for boys and another for girls. Only in such cases when it was impossible to organize two classes for lack of attendance when boys and girls could be placed in the same place. Both in Manila and in the provinces, attendance was to be compulsory for both boys and girls between the ages of seven and twelve. Education was free. The government provided the pupils with the necessary books, papers, copybooks, ink and other materials.

*Subjects Taught.*—The curriculum for boys included Christian doctrine, reading, writing, Spanish, rules of courtesy, vo-

cal music, and the principles of geography, practical agriculture, history, geography and arithmetic. Those prescribed for girls were the same, except history, geography, and agriculture for which needlework was substituted. The teaching of Spanish language was emphasized from the primary grades to the university. The law forbade any Filipino from holding any position in the government if at the end of five years after the promulgation of the law he could not speak Spanish. No person could be a member of the local *principalia* (nobility class), except by right of inheritance, if at the end of fifteen years he could not speak, read and write Spanish. And no person could be exempted from rendering personal services if at the end of thirty years he could not speak, read and write Spanish.

*The Normal Schools.*—The normal schools were established “to serve as a seminary for religious, obedient, and instructed teachers, for the management of primary schools throughout the whole archipelago.” The subjects taught included the principles of teaching, theory and practice of good citizenship, elements of pedagogy, sacred history, arithmetic, elements of natural science, Spanish history and geography, Spanish, practical agriculture, vocal and organ music, religion, and theory and practice of writing.

There were two kinds of students in the school. They were the regular and the supernumerary. The regular students were accepted free of charge but were obliged to teach for ten years after graduation. The other group paid a sum of money, but they were otherwise the same as the other group. If a student graduated with a grade of “excellent,” he was assigned to teach in the school of *ascenso* (advanced); if his grade is “good” or “fair,” his assignment was at the school of *entrada* (beginners); and if his grade is “approved,” his assignment was to be an assistant teacher.

*Supervision of Schools.*—The normal school in Manila was placed under the immediate supervision of the Jesuits who were empowered to establish rules and regulations for its governance, but their acts were subject to the approval of the Central Government. The supervision and inspection of the primary schools were entrusted into the hands of the parish priests who served as *ex officio* local inspectors. With the help of the diocesan prelate, the *alcalde mayor* (provincial governor) served as provincial inspector. But “the superior inspector of primary education shall be exercised by the Superior Governor of the Islands, with the aid of a commission which shall be established in the capital (Manila) under the name of Superior Commission of Primary Instruction.” The commission was composed of the Governor General as president, the archbishop, and seven members named by the governor as members.

*Further Educational Improvements.*—At about this time other steps were taken for the improvement of education. In

1859 the *Escuela Pía* (Pious School), which was founded by public subscription years earlier but since 1831 had been under the supervision of the city of Manila, was turned over to the Jesuits who had just returned from their exile. In 1865 the name of this school was changed to *Ateneo Municipal*. Soon it became evident that it was a first class secondary school for boys. At present it is under the control of American Jesuits. Its present name is Ateneo de Manila. It is the Alma Mater of Dr. José Rizal, the greatest Filipino patriot.

In 1865 also the Manila Observatory was founded by Father Federico Faura, a Jesuit, at the present site of Ateneo de Manila. At present it is known as Weather Bureau and is one of the most important bureaus of the Philippine government.

Improvements in the seminaries were also realized. The seminaries in Nueva Caceres, Cebu, Vigan and Jaro, which had been organized in the 18th century, as well as a seminary founded by an archbishop after the expulsion of the Jesuits, were turned over for management and administration into the hands of the Paulist Fathers who came in 1862. These priests have shown great proficiency in the training of priests. At present they have a central seminary in Manila.

In 1867 a royal order made the University of Santo Tomas supervisor of all secondary schools. This order virtually made the University a public institution. Prior to this the courses in secondary education had not been systematized. After this a uniform system of instruction was realized. The primary course lasted more or less three years (*infima, media, superior*), while the secondary course was to be taken for five years at the end of which, after a successful examination, both oral and written, a student is granted the degree of Bachelor of Arts. The attainment of this degree entitled one to enter any professional studies.

The training of women teachers for primary schools began in 1868 in the Municipal School (Manila), which was under the Sisters of Charity. In 1875 a normal school for women was opened in Nueva Caceres. In 1893 the Superior Normal School for women, similar to that for men, was opened. The Assumption Sisters were in charge of this school. It was the work of this school to give examinations to all women aspirants to the teaching position. At that time it was a great distinction to be a *maestra* (teacher); in fact that was the highest position a woman could aspire.

*Other Schools.*—There were other schools besides these. Before the close of the 19th century, the Filipinos alone owned, controlled, and managed about a hundred secondary schools. The government, the religious corporations, and private citizens also opened many more. In 1820 the government founded a nautical school to prepare Filipinos and Spaniards for marine service in the Spanish navy. In 1824 the *Sociedad Econo-*

*mica de los Amigos del Pais* opened a school of drawing. The School of Commercial Accounting was established in 1839; the School of Commerce, in 1840; the School of Practical Telegraphy, in 1842; the Academy of Drawing and Painting, in 1849; the Agricultural School, in 1889; the School of Arts and Trade, in 1890; La Concordia College for girls, in 1868; and the Assumption College, in 1892. In the provinces secondary as well as vocational schools were also opened. Further improvements were made in the University of Santo Tomas.

#### *Schools During the Revolution*

*Schools Closed.*—Soon after the outbreak of the Revolution of 1896, most of the schools were closed, and only one or two which were in the Walled City continued their classes. The closing of these schools was necessary for the preservation of the lives of students and professors. But the University of Santo Tomas, except for the academic year 1898-1899, continued to open its doors. "It is a curious fact which should be taken into account to overthrow at its base the assertion that the Filipinos hated the teachings of the Friars," writes Dr. Sanchez, "that exactly during the last period of the Spanish rule in 1897 to 1898 when the revolution was at its height, while the passion against the Spaniards was burning highest, matriculations at our University (Santo Tomas) were more numerous than at any preceding time; for they amounted to no less than one thousand one hundred and twenty-one."<sup>11</sup>

*The Malolos Congress and Education.*—A sound proof of the Filipinos' love for education was the establishment of a school system during the second epoch of the Revolution. Even in the department of *Fomento*, there was a director of public instruction whose duty was to advise the President on educational matters. The revolutionary congress that met at Malolos during the last months of 1898 approved among other things the establishment of elementary schools, secondary schools, a military school, and a university. The first two were not established, but military school and the university were really founded. The Malolos constitution itself provides for free and compulsory primary education.

The organization of the Military Academy took place in October, 1898, in Malolos. The aim was to train soldiers for better military service. Its director was Manuel Sityar who was formerly a commissioned officer in the Spanish Civil Guard.

The Universidad Literaria de Filipinas was founded simultaneously in Malolos (later transferred to Tarlac), with Joaquin Gonzales as the first president, and Mariano Crisostomo as general secretary. The members of the faculty included Cayetano Arellano, Pedro A. Paterno, Felipe Calderon, T. H. Par-

<sup>(11)</sup> *Op. cit.*, English edition), p. 132.

do de Tavera, Pablo Ocampo, Antonio Luna, Jose and Alejandro Albert, Manuel Zamora, Justo Lukban, and Ariston Bautista. It offered courses in medicine, civil law, canon law, natural law, administrative law, surgery and pharmacy. The president of the Republic was vested with the power to appoint the faculty members, who, in turn, elected the president. The first graduation exercises took place on September 29, 1899. Like the Republic, this university was short-lived.

The Institute Burgos was founded by a group of Filipinos to give instruction in preparatory courses. The government extended recognition to it. This school continued to function for about twenty years.

### *Education Under the American Regime*

*Beginnings.*—After the Revolution came the American regime. At once the benevolence of the new master is shown. As early as 1898, Reverend McKinnon, an army chaplain, started conducting classes. Soon other classes were opened under the supervision of Captain Todd and George F. Anderson. The Taft Commission (1900-1901) continued the educational work of the military regime. In May, 1900, a superintendent of public instruction was appointed, and in the following January, a department was created by Act. No. 74 to take charge of directing and supervising the education of the people. This act is often referred to as "the organic school law of the Philippines." Subsequent acts on educational matters were made. That of October 8, 1902 created a Bureau of Education from the former department referred to above. The present Bureau of Education in Manila is only an outgrowth of that bureau, and is only one of the bureaus of the enlarged Department of Public Instruction.

In August, 1901, a few hundred American teachers arrived on board the *Transport Thomas* to help organize the new school system in the country. By the end of 1902 the number of Americans in the service reached about a thousand. Within a few years a number of Filipinos knew how to speak English, and inasmuch as the number of American teachers was not sufficient to fill the need of an ever-increasing school population, it became necessary to make use of the services of these Filipinos. In many cases these native teachers underwent only three or four years of schooling; nevertheless, they showed remarkable efficiency. In October, 1909, the first group of Filipino pensionados went to the United States to further their studies.

*General Objectives.*—From the beginning, the new school system has consistently aimed to serve the best interest of the country. Its general objectives may be summed up into six groups: (1) to provide a common medium of communication in the country; (2) to extend to every child of school age the



advantages of complete elementary education; (3) to promote the formation of an intelligent and enlightened public opinion; (4) to help decrease, if not totally eradicate, illiteracy; (5) to instruct people on health problems; and (6) to help them secure economic self-sufficiency.

*Emphasis on the Use of the English Language.*—Following the instructions of President McKinley and in consonance with the very recommendation of representative Filipinos, the government urged the use of the English language as the medium of instruction in all schools. "In view of the great number of languages spoken by the different tribes," states the instructions, "it is specially important to the prosperity of the Islands that a common medium of expression be established and it is obviously desirable that this medium be the English language." Because of this policy, after thirty years under the new regime, the English language has become the most widely diffused in the whole country.

*Types of Schools.*—The system of education established by the new regime is divided into three general units or courses: a four-year primary division; a three-year intermediate division; and a four-year high school or secondary division. To these may be added the courses of junior college level given in the Philippine Normal School, the Philippine School of Arts and Trade, and the Philippine Nautical School.

(a) *Primary Division.*—"The primary schools," states the Bureau of Education publication, "provides for instruction and training principally in language and reading, spelling, writing, arithmetic, social science, elementary science, music, drawing, industrial arts, character, health, and physical education."<sup>12</sup>

(b) *Intermediate Division.*—The same publication states: "The intermediate schools provide for instruction and training chiefly in language, reading, spelling, writing, arithmetic, geography, Philippine history and government, music, drawing, housekeeping and cooking, home nursing, food selection and diet, sewing, lace making and embroidery, handweaving, woodworking, gardening, character, health, and Physical education."

(c) *High Schools.*—The high school or secondary division is classified into academic, commercial, home-economics, teacher-training, trade and agricultural. In the academic type the courses offered include language, literature, history, government, science, mathematics, and economics. In other types vocational courses are prescribed.

*Public Vocational Schools.*—Since the beginning of the new regime, stress has been given to vocational training. Since 1900 the Bureau of Education has required all elementary public schools to have courses in industrial arts, such as gardening, basketry, carpentry, and bamboo-rattan industry. The Bureau,

(<sup>12</sup>) *Thirty-Sixth Annual Report of the Director of Education*, Bureau of Printing, Manila, 1936, p. 9.

likewise, has published and issued industrial bulletins. It had until 1928 an industrial division; in that year it was reorganized under a new name, Division of Vocational Education, with four sub-departments: (a) agricultural instruction, (b) trades and industries, (c) home economics, and (d) placement.

In 1901 the Philippine School of Arts and Trade was established in Manila; and since 1914 similar ones, in the provinces. By 1925 there were no less than twenty-one trade schools conducted by the government.

In 1904 the Philippine School of Commerce was founded. Since 1912 a number of schools of household industries have been organized.

Agricultural schools were established in Muñoz, Nueva Ecija; Mt. Province; Pili, Camarines; Samar; Abra; Palawan and in other places. By 1929 there were fifteen of such schools. Ten smaller farm schools have been established elsewhere.

The Philippine Nautical School which is the only one of its kind in the country aims to train Filipinos to become marines. The course comprises a training of four years: two years theoretical and two years practical.

The government also established a school for the deaf and the blind.

*The Philippine Normal School.*—To train Filipino teachers of the primary grades, the government opened the Philippine Normal School in 1901 in the city of Manila and about ten Junior normal schools in the provinces later. The course which is of the junior college level comprises a period of two academic years. Before 1910, intermediate grade graduates were admitted, but since ten years ago only high school graduates are qualified for admission. The curricula of the Philippine Normal School include the academic, the home economics, the combined academic and home-economics, and commercial courses. Enrollment in this school was only 60 in 1908; 102 in 1909; but it soared to 1,571 in 1929. At present it has only about a thousand.

*The Growth and Development of the Public Education.*—The following table will illustrate the growth and development of public education in the Philippines:

| Years | No. of Schools | No. of Teachers | Total Enrolment |
|-------|----------------|-----------------|-----------------|
| 1906  | 2,376          | 6,033           | 366,483         |
| 1911  | 4,057          | 8,967           | 470,265         |
| 1916  | 4,650          | 12,051          | 635,228         |
| 1921  | 7,590          | 24,169          | 1,047,063       |
| 1926  | 7,278          | 25,320          | 1,061,525       |
| 1931  | 7,761          | 28,469          | 1,205,427       |
| 1934  | 7,677          | 27,065          | 1,199,881       |
| 1935  | 7,830          | 27,855          | 1,229,242       |

*Finances for the Public Education.*—Finances for public education come from three general sources. They are the government subsidy, tuition fees, and voluntary contributions. The government subsidy comes from the insular, the provincial, and the municipal funds. For the year 1934 the total government expenditures for public education amounted to ₱22,957,919.18, or 18.45 per cent of the total government expenditures for all activities. Of this amount the municipal aid was 25.07%; the provincial aid was 11.64%; and the insular aid was 20.10%. The tuition fees collected in the same year amounted to about ₱540,000.00, while voluntary contributions which consisted of money, land, labor, and materials, also for the same year, amounted to about ₱407,000.00.

The expenditures comprise the salary of the bureau personnel, the materials used in schools and offices, the cost of the buildings and premises, and other miscellaneous outlay.

*The University of the Philippines.*—As a fitting realization of the Filipinos' dream of having a government owned and government run institution of higher learning, the Philippine Assembly, by an act of 1908, created the University of the Philippines. Its first president was Murray Barlett. In accordance with its charter, the University is governed by a board of regents, vested with corporate powers. The board is composed of members who are partly elective, partly appointive, and partly *ex officio*. The president of the University is chosen by the Board of Regents, and is *ex officio* member of that body. The president is the immediate head of the University. In this capacity, he is assisted by a University Council which is composed of professors, associate professors, and assistant professors. The powers of this council include the power to "prescribe the courses of study and rules of discipline, subject to the approval of the Board of Regents".<sup>13</sup> Its faculty members are chosen by the Board of Regents. The finances of the University come mostly from the government and partly from "tuition fees, donations, various fees, sale of agricultural products and interest of its bank deposits."<sup>14</sup> With central offices and magnificent buildings in Manila, the University has branches in Los Baños (Laguna), Cebu, and Vigan, and a research station at Puerto Galera in Mindoro. Its summer classes are usually conducted in Baguio. Its enrollment rose from 67 in 1908 to 8,000 in 1930; after that it declined a little; and at present (1937), it is 7,000. Despite its youthful existence, it has shown leadership in various activities.

*Community Assemblies.*—Education is further extended by the government by means of holding community assemblies and

<sup>(13)</sup> For more detailed account of the University of the Philippines, read E. Alzona. **A History of Education in the Philippines** (1565-1930), 1932, Chap. XXI, pp. 271-333.

<sup>(14)</sup> Read F. Estella, "Finances of the University of the Philippines" in the **Philippine Social Science Review**, vol. 4, No. 1, pp. 58-65.

providing education to the adults. The system of community assembly was introduced here in 1932 by Governor Theodore Roosevelt, Jr. These assemblies are usually held in rural districts to educate the adults on various aspects of life. The first community assembly was held in September, 1932, in the barrio of Julong Duhat, in Malabon, Rizal, with Governor Roosevelt as the principal speaker. By the end of 1935 there had been about 5,000 of such assemblies held. Most of the lectures were given by the personnel of the Bureau of Education. Small pamphlets and other reading matters are also distributed by the government free of charge. Some of the topics of the lectures and pamphlets are "The Meaning of Your Vote and How to Use It," "The Return of Your Peso Invested in Taxes," "Home Sanitation," "Farmers Should Select Their Rice Seed," "My Nipa Hut," "Save the Babies and Children," and "Tuberculosis: What It Is and How It May Be Prevented."

*Education of the Adults.*—Although the adult education movement started even during the Spanish regime, it was not until recently when it began to show some real life. In 1908 the government started with its civico-educational lectures. In 1932 Governor Roosevelt introduced the community assemblies. The defunct Supreme National Council, the U.P. Adult Education Circle, the U.P. Chapter on Literacy, the Literacy Demonstration Club, and the Philippine Association for Adult Education have given great impetus in the adult education movement. The government realized the need of educating the adults who had no chance to learn during their childhood. Accordingly in 1936 it created a new office under the Department of Public Instruction. This is the Office of Adult Education, with Mr. Segundo Infantado as director. With the establishment of this office, it is expected that the campaign for literacy and the formation of more intelligent and enlightened public opinion will be greatly aided.<sup>15</sup>

#### *Growth of Private Education*

*Founding of New Private Schools.*—Similar progress is noticeable in the growth of private education. This is shown not only in the increase in enrollment but also in the improvement of the old private schools and the founding of new ones. Private initiative along this line is very obviously seen. As early as during the days of the military regime, secular schools began to exist. In 1900, for instance, were founded the Instituto de Mujeres, the Liceo de Manila and the National University. In 1901 San Beda College and Silliman Institute (now a university) were established. The Celogio Filipino was founded in 1903; Ateneo Rizal, in 1904; St. Scholastica College, in 1906; De La Salle College, in 1911; Holy Ghost Col-

<sup>(15)</sup> Read A. L. Agorrilla, "The Adult Education Movement in P.I., *The Herald Mid-Week Magazine*, Sept. 16, 1936.

lege, in 1912; University of Manila, in 1914; St. Theresa College, in 1916; Far Eastern College (now a university), in 1919; Jose Rizal College, and the National Teachers' College (1929). More schools were established in the provinces. There are at present 371 private schools in the country operating with government recognition.

*Old Schools Improved.*—The coming of the new era necessitated changes in the old schools; accordingly, changes were instituted. The University of Santo Tomas acquired a big campus at Sulucan (Sampaloc, Manila) where it built several imposing edifices to house its ever-increasing enrollment. While retaining some of its classes in its old Intramuros building (specially those of law and the last three years in medicine), it conducts most of its classes, exercises and other activities in the new quarters. The inauguration ceremonies of the central building took place in 1927. It abandoned its courses in dentistry and mid-wifery, but opened new courses like education, commerce, Liberal arts, engineering—civil, chemical, mining—, journalism, architecture, home economics, and high school. Women are now also permitted to enroll in pharmacy, education, fine arts, high school, medicine, philosophy, journalism, liberal arts, and law. A modern seminary building, a big gymnasium, a big swimming pool, an anatomy building, an engineering building, and stone walls to enclose its campus are the latest material improvements it has made.

The Ateneo de Manila, after the disastrous fire that destroyed its house in Intramuros several years ago, is now in its modern quarters at Padre Faura Street, near the University of the Philippines. New additions, material and otherwise, have been made. It has offered new courses such as commerce and law.

Up-to-date changes have also been made by Letran College, Sta. Isabel College, Sta. Rosa College, Sta. Catalina College, Beaterio, Assumption College, and others.

*Growth of Private Education.*—Filipinos' love of education is equally shown in the growth of private education in this country. The number of accredited secondary schools in 1913 was 30, but in 1937 (January), the number was 285. In 1928, the total enrollment in the private elementary schools was 43,081; in 1936 it was 52,369. In 1929 the total enrollment in all private schools was 93,618; in 1936, it was 102,096. In 1929 the total enrollment in professional courses was 9,528; in 1936, it was 13,703.

*Government Supervision of Education.*—The government exercises general supervision and control over both public and private education. The Department of Public Instruction, which is one of the executive departments of the government, has powers to issue rules and regulations governing the educational system of the country. Its secretary, therefore, is the highest government personnel in matters affecting education. An under-secretary assists him in his work.

Within this department is the Bureau of Education which takes the immediate supervision and control over all matters pertaining to public education. At the head of this bureau is a director, an assistant director, the chiefs of various departments and divisions, and a host of minor personnel in the central office in Manila, assist the director in his manifold functions. Field supervisors and other employees are sent by the bureau to keep the different public schools to function in accordance with law.

Directly in charge of the supervision and control of private education is a new office now known as Bureau of Private Education, (until a year ago, its name was "Office of Private Education"). This new bureau is to the private education as the Bureau of Education is to the public education. Mr. Lino Castillejo, an eminent educator of this country, is the first director of this bureau.

In accordance with law, pupils from accredited private schools can enroll in public schools, and vice versa.

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# PHARMACY

## WONDERS OF PLANTS

By E. T. Karganilla

From time to time plants are found to present various phenomena which are literally termed as "miracles." Most common to our notice is the *siempreviva* or *katakataká* (*Bryophyllum pinnatum*), the leaves of which produce young plants. This plant reproduces by means of leaves; plantlets appear at the notch which develop into mature plants if the roots are safely anchored on the soil. This seed function of the leaf encouraged several investigators to experiment other species which led to the discovery that kamote (*Ipomoea batatas*) can be propagated also by means of leaves. With encouraging result a Professor in the Agricultural College has successfully propagated by means of leaves several species belonging to different families.

### *Plants That Eat Animals*

About 500 species of carnivorous plants are known in the vegetable world. These plants are the sundews (*Drosera*), fly traps (*Dionaea* and *Aldrovanda*), pitcher plants (*Cephalotus*, *Darlingtonia*, *Heliamphora*, *Nepenthes*, and *Sarracenia*), bladderworts (*Utricularia*), and butterworts (*Pinguicula*). Representatives of these animal-eating plants (21 species) are found endemic in the Philippines. These plants exhibit a variety of devices for the allurements, capture, imprisonment, digestion, and absorption of their prey which are performed by the leaves. Since they thrive in different localities — in water, damp soil, and top of trees, their preys are also variable. Usually larvae of aquatic insects, crustaceans (*Cyclops*, *Daphnia*, and *Cypris*), slugs, spiders, other insects (ants, cockroaches, beetles, and butterflies) and even rodents comprise their captives. The writer found a frog in the pitcher plant (*Nepenthes*) when he was detailed to make botanical collections from Mt. Makiling in April, 1934.

In this connection the man-eating tree, although fictitious, is worth mentioning. This is the "deadly upas" tree (*Antiaris toxicaria*) locally called *dalit*, *dita*, *lata*, *mananaw*, and *salongon*. The milky sap is toxic and is usually employed for poisoning arrows and spears by the Negritos of Cagayan.

### *Plants Have Finicky Appetites*

We have learned from the study of plant nutrition that plants take in food substances for growth, repair, storage, etc. Food materials from the soil are taken in by the roots but oftentimes the soil does not contain all the elements which are needed by plants, so that fertilizers are added. Lately Professor Schermerhorn pointed out that plants are like children—have finicky appetites. "Each variety of vegetable group requires different feeding and we'll have to learn how to feed them as varieties, catering to their whims regarding fertilizer preference and the exact time when a given variety of plant seems to want and need nutrition."

### *The Invisible Weed*

The *makahia* (*Mimosa pudica*) is not only a sensitive plant but also an invisible weed. Whenever it is trampled or bitten by the hungry quadropeds the tiny leaflets close together into thin lines of dull grey unnoticeable against the dull background of the soil. This behavior of the leaflets is due to the motor impulses which make the four subpetioles approach each other laterally thus causing the upward closure. This is immediately followed by the sensed impulse which causes the fall, thus the leaf presses itself close to the ground. Like the kitten hiding under the sofa, makahia escapes danger by making itself invisible.

### *Star of Evil*

Almost all kinds of plants that thrive in the desert are eaten by animals. The hungry animals would cut down in a moment what it took months to build, such that plants must have protective adaptations. The carrion flower of tropical Africa (*Stapelia* sp.) has almost a reptilian texture and coloring, and its odor is so overpoweringly ill that it gives many persons a headache just to smell it. "For its attractive form, the sinister aspect of the flower is for protection because it flourishes in the desert where the struggle to get growth is severe besides the presence of hungry and thirsty animals."

### *Orchids That Look Like Girls*

Flower forms suggest doves, swans, and even elephants to folks who keep their imaginations young and active. "Orchids can look like dancing girls, or a variety of other things because they are such highly specialized flowers. They have evolved one of the most astonishing methods of transferring pollen from one flower to another and in doing so have developed their petals and sepals into all sorts of unusual and beautiful forms. It is all done to attract big bees, and to maneuver them into just the right position for receiving and carrying the masses



of pollen grains; but incidentally the orchids make themselves into things of beauty and joys forever especially of flourists who reap the golden harvests for expensive feminine tastes."

### Flowers "Love" The Moon

Poetically speaking flowers that open at night are lovers of the moon. The dama-de-noche (*Cestrum nocturnum*) always open at night, its presence in the dark is manifested by its scented odor. A cactus (*Hylocercus undatus*) blooms at night such that it is called the "queen of the nightbloomers." An Indian water-lily (*Nymphaea* sp.) "loves" the moon and is frightened by the sun so that she opens out her heart at the touch of the moonbeam and keeps watch all night long; she shrinks afrighted from the rude touch of the sun and closes her petals during the day.

Scientifically speaking the Indian water-lily does not close with the appearance of the sun, instead its closing and opening follow respectively the rise and fall of the temperature. "The flower is in a position of sleep during the day; a rapid fall of temperature occurs at 6:00 p.m. and the petals begin to open, at first slowly, then very rapidly. The flower is completely open and full expanded by 10:00 p.m. Though the temperature continues to fall, there is no further possibility of expansion beyond the maximum. At about 6:00 a.m. the temperature begins to rise, so that reverse movement of closure sets in. The flower continues to close very rapidly till the closure of 'sleep' becomes complete by about 10:00 a.m." This reverse order of the reaction is due to the fact that the two sides of the petals differ in sensibility—that is the outer side of the petal is more sensitive, hence during the rise of temperature, the outside grows faster than the inside, thus producing a closing movement. During the fall of temperature, the reverse movement takes place, since the retardation of growth is greater in the more sensitive outer side.

### Flowers Like Sun-Dial Indicate Times

During the blooming season of plants several species have their flowers open at definite times of the day. Most common to our knowledge is the four-o'clock (*Mirabilis jalapa*) which is called the "Marvel of Peru." As its name indicates the flowers usually open at about 4:00 o'clock in the morning. A species of Hibiscus (Venice Mallow) which is a native of Italy and Austria has its purple and yellow flowers opening at 8:00 o'clock in the morning but after having received the beams of the sun, close at 9:00 a.m. There is a flower called Star of Bethlehem (*Ornithogalum* sp.) which opens for 15 days regularly at 11:00 a.m. In French it is called Dame or Belle d'onze heures because it wakes up and opens her eyes so late in the day. A cute flower that opens

in the afternoon is the *Iris dichotoma* sometimes called "Afternoon Iris" because the corolla never expands until after mid-day.

### The Flirting Flowers

Most flowers appear charmingly elegant and winsome when the petals are opening but as the days go by their colors become lighter, slowly losing their bright tinge like the faded rose. This is the natural tendency of flowers but some species become more attractive and fascinating because their petals acquire deeper coloration as they are exposed to the brightness of the silver-sun. The amapola (*Hibiscus mutabilis*) which is called the "Changeable Rose" is very good example because when it opens it is white, then it soon changes to rose color, and finally to purple. Another species is the niogniogan (*Quisqualis indica*) which bears flowers that open with white color, then changes to pink and later reddish-purple. This behavior indicates that the flowers are flirting.

### Fruits That Shoot

One way in which plants effect an active seed dispersal is by hurling the seeds through the air by the action of sudden released spring mechanisms. In Violets when the pods are ripe, the carpels press harder and harder until suddenly the pressure overcomes friction that the seeds are shot to a distance. Likewise the tañgan-tañgan (*Ricinus communis*) and the touch-me-not or kamantigui (*Impatiens balsamina*) produce a sound when the fruits break off thus hurling their seeds away. The Indian Sand Box (*Hura crepitans*) upon releasing its seeds explodes like a pistol shot. But there is still another fruit, the Squirting Cucumber (*Ecballium elaterium*) which shoots its seeds to a far distance with explosive sound.

### The Dancing Leaflets

The leaf of a pantropic weed (*Desmodium gyrans*) which is locally called *dipdipi*, *dumdum* and *sigbut-hapang* presents a very surprising phenomenon because of the ceaseless activity of the opposite leaflets. On a warm day the leaflets dance continuously up and down and it is believed by the Indians that they dance to the snapping of one's fingers. "In reality they require no such encouragement for the minute pulvinus at the joint of the leaflet undergoes of its own accord, a sudden contraction, followed by slow expansion and recovery which would make the leaflets move up and down like the semaphore formerly employed for telegraphic signalling." With this behavior the weed is sometimes called the "telegraph plant" because it exhibits automatic pulsation which would make the opposite leaflets dance during a warm day.

*Plants Can Be Made to Sleep*

Usually plants with pinnate leaves sleep at night by closing their leaflets which open wide during the day time. At noon however when the temperature is high the leaves are said to have a siesta as the leaflets close together. This tendency of the leaves is a means employed to retard the high rate of transpiration. But if the acapulco (*Cassia alata*) is shaded or covered with black cloth at day time, the leaflets hung down as if they would be sleeping at night. By this procedure plants are said to be induced to sleep against their will.

Similarly the apple trees are "put to sleep for long naps" with the wintery blasts which shear the trees of leaves.

*Plant Like Animal Has a Heart*

The heart of a plant is at the internal layer of the cortex abutting upon the young vascular tissue. This tissue produces the maximum activity when the Electrical Probe was inserted to locate the heart of the plant. The apparatus was set in such a way that one electrical contact was attached to the epidermis of the leaf, while the other contact was inserted transversely into the stem. If the Probe comes in contact with the pulsating layer electrical signals are sent out which are automatically recorded in the galvanograph. The most intense activity recorded in the galvanograph was found to be in the internal cortex after a transverse section of the stem was made. This propulsive tissue, although a cylindrical tube, is said to be the heart of the plant which corresponds to the elongated heart of lower animals.

*Plants Heal Their Own Wounds*

The tissues of plants have a remarkable power of healing injuries which befall them. Any break in the soft tissues is healed partially within a few hours and completely within a few days. This healing process is accomplished by the periderm through the production of wound cork. "About wounds or dead tissue in practically any part of the plant (but rarely in leaves) a phellogen layer may be formed in the layers of the uninjured living parenchymatous tissue adjacent to the wound. This layer forms phellem and phelloderm in the normal way thus healing the wound. Tissue dead from any cause is usually shut off from that which is healthy by a periderm layer, or by a suberized layer formed from preëxistent cells which become chemically changed. Such layer not only prevents water from the wound, but also protects the healthy tissues against infection of fungi and bacteria."

*Wounded Maple Tree Eating Own Heart*

At the great axial park area of Washington, D.C. there

stood a peculiar maple tree that was literally eating its own heart out. A storm tore off one of its main branches thus leaving a gaping wound, open into the pith of the tree which was already rotten and hollow. From the upper side of the scar a number of branches grew. But adventitious roots developed at the wound callus which hang down into the hollow center of the tree, the tips reaching the rotten wood which had been decayed into a moist black humus. In this status the maple tree was literally eating its own heart.

#### *Trees Swallowing Boards*

Visitors at Orkney Springs, Virginia, were surprised to have seen boards being swallowed by trees. Formerly the boards were set between the bases of the trees to serve as seats. As years rolled on, secondary growth of the trees developed and engulfed the boards and may in time cover them completely.

#### *The Weeping Mango Tree*

In the suburbs of Calcutta, India, there was a mango tree about 40 feet in height and its trunk about 38 inches in circumference. At one o'clock in the afternoon drops of water were noticed from a point high up in the tree. The rate of fall of successive drops being one in every two seconds; the proxym gradually subsided, and the interval between successive drops slowed down to five seconds at 2:00 p.m. to eight seconds at 3:00 p.m., to fifteen seconds at 4:00 p.m., to 150 seconds at 5:00 p.m., after which it stopped. The performance was repeated every day at 1:00 p.m. with the same sequence.

According to Bose, there was a small aperture or vent in the bark at a point high up in the tree. "This vent was usually closed by a plug of mucilage till forced out by strong interval pressure exerted by the sap at 1:00 p.m. The great increase of pressure expelled the closing plug with a resulting outflow of sap. Late in the day the sun became hidden by the leaves and the temperature underwent a rapid fall, the weeping of the tree consequently declined and was arrested in the evening."

#### *The Praying Palm of Faridopore*

In Faridopore, India, there was a date palm (*Phoenix sylvestris*), a full grown rigid tree, the trunk of which was about 10 inches in diameter. It was inclined perhaps by storm to about 60°. "While the temple bells rang, calling the people to prayer in the evening, this tree bowed down its head in adoration. By the morning its head was again erect, and this process was repeated every day of the year." The tree attained its maximum erection at 7:00 o'clock in the morning after which it began to lift itself very slowly, then very rapidly, until it left itself to the highest position at seven next morning.

Dr. J. C. Bose explained that the rise of the tree was seen to follow the fall of temperature and vice versa. Theoretically all inclined organs, whether stem, branch, or leaf, sensitive to the stimulus of gravity should exhibit the characteristic movements under variation of temperature. The geotropic action on the variation of which the movements depend is most intense when the tree is nearly horizontal, and less so when more erect. Moreover the movement of an inclined tree is more noticeable, since the ground affords a fixed object for reference. With a more erect tree, the movement would escape notice, since it would be executed with empty space as a background.

### The "Miraculous" Cross

In Gagalangin about ten years ago, a cross was found in the trunk of a sampaloc tree (*Tamarindus indica*). This cross was discovered in the hollowed groove of the trunk. This discovery attracted many persons from various places who believed it to be a miracle.

To dispel the curiosity which this cross created, a wood technologist of the Bureau of Forestry was sent to examine the trunk in which it was found. After careful examination this wood expert declared that the cross was probably carved when the tree was still small. With the growth of the tree which is accomplished by the process of secondary thickening, the cross was engulfed and covered with layers after layers of wood tissues. It remained in the trunk as formerly engraved until it was discovered during the chopping of the tree.

### "Virgin" de Acacia

An image of the Virgin was found on the cross-section of the trunk of an acacia tree (*Samanea saman*) in Sampaloc, Manila, not far from the National University building. Because of the attraction and wild veneration that the image created, a wood technologist of the Bureau of Forestry was sent to examine the tree. This wood technologist, after carefully examining the trunk, concluded: "When the tree was about 20 cm. in diameter, it was wounded, producing a scar on the trunk about 8 cm. wide. This caused decay on the wood, which extended from the bark to the very center, forming a triangular-shaped area. The tree did not die of the wound; it continued to grow and in time this wound became completely healed up. The pith of the acacia tree which is round, is taken as the head of the "Virgin" and the triangular decayed portion, the body. People need not be alarmed by this phenomenon as there is absolutely nothing strange and miraculous about it."

In Sta. Cruz, Laguna, another image of the "Virgin" was found on the trunk of a mulauin (*Vitex parvillora*). This phenomenon was called "Virgin de Mulauin."

Recently, May 29, 1937, to be exact, the discovery of a similar image on a bamboo which was used as a brace of the posts of a house in Pandacan, Manila, was published in the Tribune. This discovery attracted many people so that it was deemed necessary to send some one to examine it. Accordingly a mycologist of the Bureau of Science went to Pandacan and, upon examining the bamboo, found a fungus (*Poria tricolor*) which resembled the image of the Virgin.

### The "Miraculous" Fruit

The truest miracle in the vegetable world is the miraculous fruit (*Sideroxylon dulcificum*) which is a native of West Africa. "After eating its fruits everything even a lemon, tastes sweet. This miraculous fruit paralyzes some of the papillae of the tongue so that many things, even acid ones, taste sweet for some time after eating them." The two botanists who were offered a glass of beer to quench their heavy thirst after eating the miraculous fruit testified that they had never tasted any beer so sweet as that which a German chemist had offered them. "We at once called for some lemons and sure enough, they tasted as sweet as oranges."

### REFERENCES

1. Bose, J. C. Plant Autographs and their Revelations. The Macmillan Co., New York (1927).
2. Bose, J. C. The Motor Mechanism of Plants. Longmans, Greene & Co., London, New York, Toronto (1928).
3. Bose, J. C. Life Movements in Plants. Longmans, Greene & Co., London, New York, Toronto (1931).
4. Darwin, C. R. Insectivorous Plants. D. Appleton & Co., New York (1900).
5. Eames, A. J. and MacDaniels, L. H. An Introduction to Plant Anatomy. McGraw-Hill Book Co., New York (1925) 204-225.
6. Fairchild, D. Exploring for Plants. The Macmillan Co., New York (1931) 510-513.
7. Friend, H. Flowers and Flower Lore. 2nd Edition, W. Swan Sonnenschein & Co., London (1884).
8. Ganong, W. F. A Textbook of Botany for Colleges. The Macmillan Co., New York (1917).
9. Youngmen, H. W. Pharmaceutical Botany. P. Blakiston's Son & Co., Philadelphia, 5th edition (1930) 574-597.
10. Communication from the Director, Bureau of Forestry, May 27, 1937.
11. Graphic, March 13, 1937.
12. Monday Mail. July 26, 1937.
13. Philippines Herald, July 26, 1937.
14. Science News Letter, August 1, 1931; September 19, 1931; October 3, 1931; March 6, 1937.
15. Tribune, May 29, 1937.

# SCIENCE AND ENGINEERING

## A FUNDAMENTAL REGION OF A LOXODROMIC CYCLIC GROUP

by Prof. Jose M. Cue, Ph. D.

(a) Consider the pencil of circles thru two fixed points  $(-p, 0)$  and  $(p, 0)$ . Its equation is

$$x^2 + (y - (r^2 - p^2)^{1/2})^2 = r^2 \quad (1)$$

Differentiating,

$$x + (y - (r^2 - p^2)^{1/2})y' = 0 \quad (2)$$

Eliminating  $r$  from (1) and (2), we obtain the differential equation of the family:

$$x^2 - y^2 - 2xy/y' - p^2 = 0 \quad (3)$$

From (3), the differential equation of the orthogonal trajectories is

$$x^2 - y^2 + 2xyy' - p^2 = 0, \text{ or}$$

$$(x^2 - y^2 - p^2)dx + 2xydy = 0, \text{ which may be written}$$

$$x^2 d(x^2 + y^2 + p^2/x) = 0 \quad (4)$$

Integrating (4) we obtain

$$x^2 + y^2 + p^2 = 2qx, \text{ with } q \text{ as arbitrary constant.}$$

The last equation may be written

$$(x - q)^2 + y^2 = (q - p)(q + p) \quad (5)$$

which is the equation of a circle with center on the  $x$ -axis. If  $R$  denote the radius of (5), then

$$R^2 = (q - p)(q + p).$$

Thus the fixed points  $(-p, 0)$  and  $(p, 0)$  are inverse points with respect to any circle of the family represented by (5).

Beginning with (5) and reversing the process step by step we may readily show that a circle with respect to which two

points are inverse is orthogonal to any circle thru the two points.

Let  $z' = f(z)$  be any function. To any point  $z$  corresponds one or more points  $z'$ ; to any configuration in the  $z$ -plane, some configuration in the  $z'$ -plane. The series of operations that  $f$  represents is said to transform  $z$  into  $z'$ , or any figure in the  $z$ -plane into the corresponding figure in the  $z'$ -plane; and  $f$  is often referred to as a transformation.

In particular, the function

$$z' = (az + b)/(cz + d)$$

is called a linear transformation. It may be proved that the most general transformation that transforms  $z$  into  $z'$  in a one-to-one directly conformal manner is the linear transformation. By the previous statement is meant that to any one point  $z$  corresponds one and only one point  $z'$  and vice versa, and that angles are preserved both in magnitude and in sign.

A point which is transformed into itself is called a fixed point of the transformation.

(b) Consider next the linear transformation

$$z' = (az + b)/(cz + d) \quad (6)$$

The fixed points of (6) are

$$\xi_1 = a - d + M/2c, \quad \xi_2 = a - d - M/2c, \quad M = ((a + d)^2 - 4)^{1/2}$$

The transformation inverse of (6) is

$$z' = (-dz + b)/(cz - a) \quad (7)$$

It is obvious that  $\xi_1$  and  $\xi_2$  are also fixed points of (7).

The isometric circles of (6) and (7) are respectively

$$|cz + d| = 1 \text{ and } |cz - a| = 1, \text{ provided } ad - bc = 1,$$

which may always be satisfied by the coefficients of (6) by multiplying both terms of the fraction in (6) by a suitable factor. Both circles have the same radius  $|1/c|$ , and their centers are  $-d/c$  and  $a/c$  respectively.

Now  $\xi_1 + \xi_2 = a/c - d/c$ , whence  $\xi_1 + d/c = a/c - \xi_2$ , that is, the line joining  $-d/c$  to  $\xi_1$  is equal and parallel to the line joining  $\xi_2$  to  $a/c$ .

(c) For a hyperbolic transformation,  $(a + d)$  is real and numerically greater than 2. For such, then,

$$\xi_1 - \xi_2 = M/c, \text{ with } M \text{ real.}$$

This expresses that the line joining  $\xi_2$  to  $\xi_1$  is parallel to  $1/c$ .



But the line joining the center  $-d/c$  to the center  $a/c$  is equal and parallel to  $(a + d)/c$ , or parallel to  $1/c$ , since  $(a + d)$  is real. Hence, for a hyperbolic transformation, the fixed points lie on the line of centers of the isometric circles.

(d) For an elliptic transformation,  $(a + d)$  is real and numerically less than 2. For such, then,

$$\xi_1 - \xi_2 = M/c, \text{ with } M \text{ a pure imaginary.}$$

This expresses that the line joining  $\xi_2$  to  $\xi_1$  is perpendicular to  $1/c$ . But the line joining  $-d/c$  to  $a/c$  is parallel to  $1/c$ ,  $(a + d)$  being real. Hence for an elliptic transformation, the fixed points lie on the perpendicular bisector of, and at equal distance from, the line of centers of the isometric circles.

(e) We note further that the equations of the isometric circles of (6) and (7) may be written

$$(cz + d)(\mathbf{cz} + \mathbf{d}) = 1.*$$

$$(cz - a)(\mathbf{cz} - \mathbf{a}) = 1.$$

Eliminating  $cz$ , we obtain,

$$(c + d)(cz - a) = -(a + d)/(\mathbf{a} + \mathbf{d}) \quad (8)$$

For real values of  $(a + d)$ ,  $(a + d)/(\mathbf{a} + \mathbf{d}) = 1$ .

Hence, for hyperbolic and elliptic transformations, (8) becomes

$$(cz + d)(cz - a) = -1 \quad (9)$$

Solving for  $z$ ,

$$z_1 = (a - d + M)/2c = \xi_1 \quad z_2 = (a - d - M)/2c = \xi_2.$$

If  $z_1 = \xi_1$  and  $z$  are points inverse with respect to the circle

$$(cz_1 + d)(\mathbf{cz} + \mathbf{d}) = 1,$$

then the relation between them is given by the equation

$$(cz + d)(\mathbf{cz} + \mathbf{d}) = 1. \quad (10)$$

This may be readily shown as follows. If  $z$  is any point on the circle, it satisfies

$$(cz + d)(\mathbf{cz} + \mathbf{d}) = 1.$$

and  $\mathbf{z}$  in the second factor of the left member is the conjugate of  $z$ . If however  $z$  be any point whatever,  $\mathbf{z}$  will in general not be the conjugate of  $z$ , but of some other point, say  $\zeta$ , if the equation is to hold. Thus, for any  $z$ ,

$$(cz + d)(\mathbf{cZ} + \mathbf{d}) = 1, \text{ where } \mathbf{Z} \text{ is the conjugate of } \zeta$$

\* Bold-face type will represent the conjugate of the corresponding letters.

Dividing by  $cc$ ,

$$(z + d/c)(Z + d/c) = 1/cc = |1/c|^2.$$

This expresses that  $\arg(z + d/c) = -\arg(Z + d/c)$   
 $= \arg(\zeta + d/c)$ ;

that is,  $-d/c$ ,  $z$  and  $\zeta$  are collinear.

Now take absolute values.

$$|z + d/c| \cdot |\zeta + d/c| = |1/c|^2.$$

This shows that the product of the distances of  $z$  and  $\zeta$  from  $-d/c$  equals the square on the radius of the circle.

Since  $z_1$  is a root of (9),

$$(cz_1 + d)(cz_1 - a) = -1. \quad (11)$$

Dividing (10) by (11),

$$(cz + d)/(cz_1 - a) = -1 \text{ or } cz = a - d - cz_1 \text{ or}$$

$$cz = a - d - cz_1 = a - d - (a - d + M)/2 =$$

$$(a - d - M)/2, (a + d) \text{ being real.}$$

In the hyperbolic transformation,  $M$  is real, and  $M = M$ . Therefore  $z = (a - d - M)/2c = \xi_2$ , that is,  $\xi_1$  and  $\xi_2$  are inverse with respect to  $(cz + d)(cz + d) = 1$ .

In the elliptic transformation,  $M$  is a pure imaginary, and  $M = -M$ . Therefore  $z = (a - d + M)/2c = \xi_1$ , that is,  $\xi_1$  is its own inverse with respect to the circle in question. Similarly  $\xi_2$  is its own inverse.  $\xi_1$  and  $\xi_2$  thus lie on the circle.

The same facts may be derived with respect to the circle

$$(cz - a)(cz - a) = 1.$$

of the inverse transformation.

From the manner in which equation (8) was derived it will be observed that  $\xi_1$  and  $\xi_2$  are the points of intersection of the isometric circles, if they intersect. We may thus picture the behavior of the fixed points as the isometric circles move away from each other, starting from a position in which they intersect, provided  $a + d$  is real. As the circles separate, the intersections  $\xi_1$  and  $\xi_2$  move towards each other. At tangency, they coincide, the transformation is parabolic, with  $|a + d| = 2$ . As the circles separate further,  $\xi_1$  and  $\xi_2$  move away from each other in a direction perpendicular to their previous motion.

(f) Let  $I$  and  $I'$  represent the isometric circles of a linear transformation and its inverse respectively. It may be shown that a non-loxodromic transformation is equivalent to an in-

version in  $I$  followed by a reflection on the perpendicular bisector of the line segment joining the centers of  $I$  and  $I'$ . This process leaves circles orthogonal to  $I$  with centers on the perpendicular bisector fixed by the transformation. It is likewise obvious that the interior of any fixed circle is carried into itself.

(g) The transformation (6), if non-parabolic, with finite fixed points, may be written in terms of  $\xi_1$  and  $\xi_2$ :

$$(z' - \xi_1)/(z' - \xi_2) = Ae^{i\theta} (z - \xi_1)/(z - \xi_2).$$

If neither  $A$  nor  $\theta$  is equal to zero, the transformation is loxodromic, and is obviously equivalent to the hyperbolic transformation

$$(z' - \xi_1)/(z' - \xi_2) = A (z - \xi_1)/(z - \xi_2)$$

followed by the elliptic transformation

$$(z' - \xi_1)/(z' - \xi_2) = e^{i\theta} (z - \xi_1)/(z - \xi_2)$$

both having the same fixed points.

(h) Thus a loxodromic transformation

$$T = UV^*$$

where  $V$  is a hyperbolic, and  $U$  an elliptic, transformation. Let the isometric circles of  $V$ , its inverse,  $U$  and its inverse be denoted by  $I_v, I'_v, I_u, I'_u$  respectively. Then  $I_v$  and  $I'_v$  are equal circles (non-intersecting), by (b);  $\xi_1$  and  $\xi_2$  lie on the line of centers of  $I_v$  and  $I'_v$  by (c);  $\xi_1$  and  $\xi_2$  are inverse points with respect to  $I_v$  and  $I'_v$ , by (e);  $I_u$  and  $I'_u$  are equal circles intersecting on  $\xi_1$  and  $\xi_2$ , by (e);  $I_u$  and  $I'_u$  are orthogonal to  $I_v$  and  $I'_v$ , by (a);  $I_v$  and  $I'_v$  are fixed circles of  $U$ , and  $I_u$  and  $I'_u$  are fixed circles of  $V$ , the interiors of the fixed circles being carried into themselves, by (f).

Lastly, consider the cyclic group generated by a loxodromic transformation  $T$ . The group consists of  $T, T^2, \dots, T^n, \dots, T^{-1}, T^{-2}, \dots, T^{-n}, \dots$ . It is clear that the inverse

$$T^{-1} = V^{-1} U^{-1}$$

The region  $R$  exterior to  $I_v$  and  $I'_v$  is a fundamental region. For,  $V$  carries that part of the plane exterior to  $I_v$  into the whole interior of  $I'_v$ , and carries  $I'_v$  into a circle  $C'_1$ .  $C'_1$  surrounds the fixed point in  $I'_v$ , is within  $I'_v$ , and is a circle with respect to which the fixed points are inverse. Therefore,  $V$  carries the interior of  $I'_v$  into the interior of  $C'_1$ , and carries  $R$  into the region  $R'_1$  bounded by  $I'_v$  and  $C'_1$ . Both  $I'_v$  and

$C'_1$  are orthogonal to  $Iu$  and  $I'u$  by (a), and are fixed circles with respect to the transformation  $U$ . Since their interiors are transformed into themselves,  $U$  carries  $R'_1$  into itself. Hence  $T$  carries  $R$  into  $R'_1$ .

Applying  $V$  to the boundary of  $R'_1$ ,  $I'v$  is carried into  $C'_1$ , and  $C'_1$  into  $C'_2$ .  $C'_2$  surrounds the fixed point in  $I'v$ , is within  $C'_1$ , and is a circle with respect to which the fixed points are inverse. Thus  $V$  carries  $R'_1$  into a smaller region  $R'_2$  bounded by  $C'_1$  and  $C'_2$ . The transformation  $U$  leaves  $C'_2$  fixed and carries  $R'_2$  into itself. Hence  $T$  carries  $R'_1$  into  $R'_2$ , or  $T^2$  carries  $R$  into  $R'_2$ . It is obvious that  $T^n$  carries  $R$  into smaller and smaller regions surrounding the fixed point in  $I'v$  and bounded by circles orthogonal to  $Iu$  as  $n$  increases. As  $n$  becomes infinite, the neighborhood of the fixed point is covered with an infinite number of transforms of  $R$ .

The circles  $Iv$  and  $I'v$  are fixed with respect to  $U^{-1}$ , their interiors being carried into themselves. Therefore  $U^{-1}$  carries  $R$  into itself, since a linear transformation establishes a one-to-one correspondence.  $V^{-1}$  then carries  $R$  into a region  $R_1$  bounded by  $Iv$  and  $C_1$ , the latter being the transforms of  $I'v$  and  $Iv$ , the boundary of  $R$ , by  $V^{-1}$ .  $C_1$  surrounds the fixed point  $Iv$ , is within  $Iv$ , and is a circle with respect to which the fixed points are inverse. Thus  $T^{-1}$  carries  $R$  into  $R_1$ .

Applying  $U^{-1}$  to the boundary of  $R_1$ ,  $Iv$  is transformed into itself, and  $C_1$  into itself.  $R_1$  is transformed into itself by  $U^{-1}$ .  $V^{-1}$  then carries  $R_1$  into a region  $R_2$  bounded by  $C_1$  and  $C_2$ , the latter being the transforms of  $Iv$  and  $C_1$ , the boundary of  $R_1$ , by  $V^{-1}$ .  $C_2$  surrounds the fixed point in  $Iv$ , is within  $Iv$ , and is a circle with respect to which the fixed points are inverse. Thus  $T^{-1}$  carries  $R_1$  into  $R_2$ , or  $T^{-2}$  carries  $R$  into  $R_2$ . It is clear that  $T^{-n}$  carries  $R$  into smaller and smaller regions surrounding the fixed point in  $Iv$  and bounded by circles orthogonal to  $Iu$  as  $n$  increases. As  $n$  becomes infinite, the neighborhood of the fixed point is covered with an infinite number of transforms of  $R$ .

Thus  $R$  and its transforms cover practically the whole plane without overlapping. Hence no two points of  $R$  are congruent. In the neighborhood of any point on the boundary of  $R$  there are points congruent to points of  $R$ . Therefore  $R$  is a fundamental region.

\* See Ford, Automorphic Functions, p. 54.

# THE AVAILABILITY OF THE ZELENY ELECTROSCOPE

## FOR THE DETERMINATION OF RADIOACTIVITY OF SUBSTANCES IN THE PHILIPPINES

By *Emma A. Unson, M. S.*

### PREFACE

The main purpose of this work is to ascertain whether the Zeleny electroscope furnishes a convenient and reliable laboratory method for determining the radioactivity of substances in the Philippines. The availability of this instrument in the United States has been amply proved, several experiments undertaken by its author and others meeting with complete success. Certain conditions in the P. I., principally the high degree of humidity always present in the atmosphere, make it impossible to perform experiments here with the same degree of success as in the States, unless some precautions are taken.

The electroscope is recognized to be one of the best, if not the best means of detecting the presence of ionization current produced by radioactive substances because of its small capacity and hence great sensitivity. One way of classifying electroscopes is to classify them according to the method used in charging the instrument. One kind is charged by static methods, i.e., by an ebonite rod or by static machines giving the instrument either a positive or negative charge. The other is charged by a source of direct current which produces a difference of potential in the apparatus. Both kinds have been used in the P. I., the latter having been found more convenient. In field work or where a source of direct current is not available, charging by static methods has to be resorted to. This method has its drawbacks, the principal one being that when humidity is high as is often the case in the P. I., the potential cannot be maintained without difficulty.

The Zeleny electroscope is of the second kind and thus avoids the inconveniencies presented by the difficulty of retaining the charge. Another convenient feature is that it requires a potential of between 50 and 20 volts, which is easily furnished in the laboratory.

## FIRST PART

## I

## The Theory

## INTRODUCTION

1. *Conductivity of Gases*

Gases in the normal state are among the best insulators for electricity. Indeed, for a time it was believed that they were perfect insulators and the fact that an insulated charged body slowly lost its charge was attributed to defects in the insulators used to support the body. However, an experiment conducted by C. T. R. Wilson showed conclusively that this is not the case. He devised an ingenious arrangement of the electroscope wherein any leak across the solid insulator only tended to keep the deflection of the gold leaves at their original value, so that therefore any loss of charge had to take place across the gas alone. Under these circumstances, it was found that the body still lost its charge.

Therefore, air is always conducting. At normal conditions, this conductivity is slight, but with the action of certain agents, it may be greatly increased. Everybody is familiar with the fact that if a very high difference of potential exists between two terminals separated by air, a spark travels from one terminal to the other. This takes place in air at ordinary pressures. At lower pressures, this spark is obtained at lower potentials and at very low pressures, it undergoes certain modifications. These phenomena of the electric discharge at low pressures shall not be taken up here, nor the discharge accompanying high potential differences. I am only concerned with the behaviour of gases at ordinary pressures and in electric fields much less intense than those required to produce luminous discharges.

2. *Ionizing Agents*

The conductivity of the air ordinarily slight may be greatly increased by the action of certain external agents called the ionizing agents. It has long been known that the gases of a flame and the gases liberated by certain chemical actions possess a considerable degree of conductivity which lasts for a short time after removal from the scene of action. However this condition is not adequate for experimental purposes. Soon after the discovery of X-rays, it was found that charged bodies in the vicinity of these rays lost their charge, i.e., the X-rays rendered the surrounding air conducting. The discovery of X-rays led to a wide search for natural substances which would emit radiations similar to those of X-rays. The efforts of Becquerel and the Curies resulted in the discovery

that the salts of uranium and thorium possessed radiations having the properties of penetrating opaque substances and of causing conductivity in gases. From uranium ore, radium and other similar elements were extracted which exhibited the above properties to a remarkable degree. These substances are called radioactive substances.

Radioactive substances emit three kinds of rays called the Alpha, Beta and Gamma rays. These three rays have several properties in common such as ionizing a gas, affecting a photographic plate and producing luminiscence on a fluorescent screen, but still differ markedly from each other.

Alpha rays are properly speaking not rays but particles. They are positively charged and have the size of atoms. They are easily distinguishable from the fact that they are easily absorbed, being stopped completely by 0.1 mm. of aluminum. Also, they produce very strong ionization in the gas through which they pass. Their velocity ranges from  $1.45 \times 10^9$  to  $2.2 \times 10^9$  cm. per second, depending on the substance from which they are expelled, but is constant for the same substance. It has been proved conclusively that alpha particles consist of atoms of helium which have lost two electrons and possess a positive charge of  $9.5 \times 10^{-10}$  e.s.u. The absorption of the alpha rays is due not to the lessening of the number of particles but to the gradual absorption of their energy. A part of the great energy they possess is used in ionizing the gas. A probable theory is that the ionization produced by an alpha ray in a substance is proportional to the energy absorbed. Since alpha rays are the most subject to absorption they produce the most intense ionization.

Beta rays are distinguishable from alpha rays by the fact that they are about 100 times more penetrating than alpha rays. Because they are not absorbed so easily they produce a much less strong ionization of the gas. Their nature has been found to be identical to that of the cathode rays and therefore consist of electrons which carry the universal negative electronic charge of  $4.77 \times 10^{-10}$  e.s.u. Beta rays have much less energy than the alpha rays and are more easily scattered; their path through a gas is very complicated. Unlike the alpha rays they do not have a definite range, i.e., the particles of which the rays consist do not penetrate all to the same distance. The velocities of beta rays are much greater than that of alpha rays reaching even to 95% that of light.

Gamma rays are characterized by their exceedingly great penetrating power, their effects being measurable through 20 or 30 cm. of iron. Their ionizing power is small. Since, unlike the alpha and gamma rays, they are not affected by a magnetic or electric field, they carry no charge. They are assumed to be an electromagnetic radiation of extremely short wavelength thus explaining their penetrability. In fact they have so many properties in common with X-rays that they are sometimes described as very hard X-rays.

In short, alpha rays produce the greatest ionization, about 100 times greater than that produced by the beta rays which in turn produce about 100 times greater ionization than the gamma rays. The alpha rays are most easily absorbed, next comes the beta rays while the gamma rays are the most penetrating.

Several experiments have been performed this past century to try to find the cause of the permanent conductivity of the air. At first, the explanation was advanced that it is due exclusively to the presence of radioactive substances in the air, and repeatedly confirmed that as height increases the conductivity have led to a modification of this belief. It has been found and repeatedly confirmed that as height increases the conductivity of the atmosphere decreases, but at a certain critical height (about 2 km.), the conductivity starts to increase. At an altitude of 9 km., Kolhorster found the conductivity to be 10 times that at the earth's surface. These facts show that the conductivity is produced by 2 types of radiation, one coming from the ground and another coming from the sky. The decrease and then increase of conductivity with height are thus accounted for. The radiation from outside the earth is conceded to consist in the ultra-violet rays of the sun and cosmic rays, the latter being an exceedingly penetrating radiation which pervades all space.

## II

### IONIZATION THEORY OF CONDUCTION IN GASES

The theory states that the ionizing agents produce in the gas carriers or ions charged some positively and some negatively at a rate which is independent of the electric intensity of the field and depends only on the properties of the rays and the gas. These charged carriers are called gaseous ions by analogy with the carriers in electrolytic conduction. These gaseous ions convey the current across the gas by moving in opposite directions, through the gas under the electrostatic field set up by the charged body, in much the same way that a current is conveyed through the solution of an electrolyte by the motion of positively and negatively charged electrolytic ions.

According to the electron theory, the charged systems are produced as follows. Due to the action of the ionizing agent, the neutral gas molecules lose their negative electric charges or electrons and therefore become molecules with an electric positive charge. The electrons which have been dislodged from the neutral molecule, due to electrostatic attraction are surrounded by other neutral molecules, thus forming the negative ions. The molecules from which electrons were removed are also surrounded by neutral molecules, constituting the positive ions. These are the small ions. There are also large



ions of order much higher than the small ions and which consist of solid or liquid particles with electric charge. Most common are the dust particles in the air.

With this theory, the discharge of insulated charged bodies can be explained. If a body has a positive charge and is surrounded by a gas containing charged ions, the negative ions in the gas will be attracted by the positively charged body and will give up their charges to it thus bringing about the discharge of the body.

Though the action of the gaseous ions are somewhat analogous to that of the electrolytic ions, still there are marked differences. Electrolytic ions exist due to the fact that a salt is dissolved in the solution and they exist as long as the salt remains dissolved while gaseous ions exist only by virtue of an external ionizing agent and exist only as long as the agent is present. Also the number of ions in the gas is only a small fraction of the number in electrolytes. The increase in current produced by a given increase in the electric field is less the greater the field already acting. This is further explained in the next paragraph.

The study of the current in gases when different potentials exist between the plates of an electroscope presents interesting results illustrated in the accompanying graph.

For very small values of the potential, not more than one volt, the current is proportional to the potential applied. When the potential is slowly increased, the gas no longer obeys Ohm's law. The increase in current due to an increase in potential decreases. When a certain difference of potential is reached, the current becomes constant, even with further increase of the electric field. At this point, the current is independent of the voltage. This current is called the saturation current and the required voltage, the saturation voltage. The value of this saturation voltage depends on the nature and pressure of the gas, on the distance apart of the electrodes and their area and also on the intensity of ionization of the gas. If after the saturation voltage is reached, the potential is increased to several hundreds of volts (different in different circumstances) the current will again increase rapidly and at very high potentials the spark or arc occurs.

The above phenomena can be explained in the light of the theory of the formation of ions in conducting gases. The ionizing agent produces ions of opposite charges in the gas. Since the gas as a whole is uncharged, then the total charge on the negative ions is equal to the total charge on the positive ions. If each ion carries the same charge ( $e$ ) then the number of positive ions equals the number of negative ions. These moving ions carry the current across the gas and give up their charges to the oppositely charged electrodes.

At the same time that the gas is gaining ions by the action of the ionizing agent, it is also losing ions in other ways,

Consider first the action when no electric field is acting. Since the ions are oppositely charged, they attract each other and 'recombine' thus forming neutral particles which are no longer capable of carrying the current.

The rate of recombination is clearly proportional to the number of ions present in the gas. If  $n_1$  = number of positive ions and  $n_2$  = number of negative ions then the rate of recombination equals  $an_1 n_2$ , where  $a$  = constant = coefficient of recombination. If  $n_1$  equals  $n_2$  equals  $n$ , as is the usual case, then the rate equals  $an^2$ . The rate of increase of the number of ions formed is evidently equal to the number formed per second by the ionizing agent minus the number lost by recombination and diffusion. While the ionizing agent is acting, a state of equilibrium is reached when the number of ions being produced is equal to the number being lost. As soon as the ionizing agent is removed, production stops and recombination continues until all the ions have disappeared thus rendering the gas non-conducting.

Ions are also removed by diffusion to the sides of the container. The effect of diffusion is large or small according to the volume of the gas. If the volume is large, the number of ions lost by diffusion will be small as compared to the number lost by recombination; if the volume is small it will be great.

Now consider the action when there is an external electric field acting. The ions will disappear not only by recombination and diffusion but also by attraction to the oppositely charged electrodes. Hence, the rate of disappearance of the ions is greater. The relation between the current and the applied potential already illustrated by a graph can now be better explained. In the beginning when the field is very weak the ions move slowly across the gas towards the plates and most of them recombine. The number of ions reaching the plates is therefore small. Since these ions convey the current the result is a weak current. Since the number of ions present in the gas is constant, the current is proportional to the applied field. This case corresponds to the first part of the graph. When the field is increased, a larger proportion of the ions are attracted to the plate and a smaller proportion recombine. The current increases slightly but no longer obeys Ohm's law. This phase corresponds to the part of the graph before the saturation current. If the field is increased to such a value that each ion as soon as it is produced travels to the opposite plate without any chance of recombination with other ions, then every ion formed goes towards the plate. A maximum current is produced. Increasing the field moderately cannot produce any further increase of the number of ions reaching the plate. This corresponds to the level part of the curve—the saturation current. Finally, the electric field is made so great that the ions in their rapid movement across the gas collide with other molecules thus forming ions. Since each ion produces by collision other ions

which in turn produce more ions, the current may rise to unlimited values. Under these conditions the spark takes place. This corresponds to the last part of the graph.

### III

#### EXPLANATION OF DISCHARGING EFFECT OF MOISTURE.

The phenomenon of the rapid discharge of the leaf when not enclosed in a dry chamber is by no means an extraordinary one. This discharge, when no radioactive substance is placed in the instrument, is generally believed to be due to two causes. First, the permanent cause, viz., the radiations (cosmic rays, radioactive substance) coming from the atmosphere and the surroundings, which is relatively constant; second, the variable cause, viz., the moisture present in the atmosphere. The first cause has already been taken up, the second will now be considered. I made some determinations at different times of the natural leak of the Zeleny electroscopes and obtained an almost constant value for the period—about 2-1/2 hours. The length and constancy of the period indicate that the leak is mainly due to the first cause, moisture being practically absent in the dessicator.

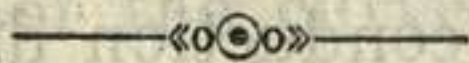
It is an old and well-known fact that a charged body loses its charge much more rapidly in summer when the atmosphere is warm and humid than in winter when it is cold and dry. Though these facts seem to warrant the assumption that the conductivity of the air increases with the temperature and humidity, this explanation is false. Experiments performed by Warburg and Boys, among several others, showed that moist air is not more conducting than dry air.

In an experiment conducted in the States, sometime ago, it was noticed that when undried air was used, the condenser receiving the emanation remained permanently conducting. This condition was relatively so great that ionization currents could not be measured by the same electrometer. Occurrence of an internal metallic contact in the insulation was rejected as an explanation, after a complete overhauling of the instrument produced no change. This conduction vanished overnight but was reproduced as soon as fresh air was passed through the condenser. A cause of this conductivity was suggested, namely, that a film of moisture coming from the newly-introduced air was precipitated in the condenser to the detriment of the hard rubber insulation. This explanation was confirmed by the fact that when the incoming air was thoroughly dried, the extraordinary conduction disappeared, the insulation of the condenser being at once restored. This particular case has been explained at some length because the phenomenon described is often met with here.

In the Philippines, experimenters with electroscopes encounter difficulties caused by the prevalent high humidity. To quote specific cases, Wright and Heise (see *Phil. Journal of Science* v. 12, A, p. 145) in their experiment to determine the radioactivity of Philippine waters, used one of the Spindler and Hoyer aluminum-leaf electroscopes. To counteract the excessive leak caused by the high humidity, they found it necessary to introduce a small tube of calcium chloride into the circulation system, so that all gases were dried before entering the ionization chamber. They found it impossible to obtain reliable readings without this precaution. As a result of this precaution, they obtained a natural leak furnished by the instrument makers. Blackwood in his experiments on the radioactivity of the atmosphere at high elevations where the humidity had a minimum value of 90%, found it necessary at night to heat the ebonite rod used to charge the electroscope, in order to maintain the voltage. (See *Phil. Journal of Science*, v. 10, A., pp. 37-47.)

It is evident, therefore, that humidity is an important factor to be reckoned with in conducting experiments with electroscopes. Not that humid air is more conducting than dry air. This has been shown to be untrue. But, because high humidity results in the formation of a film of moisture on the surface of bodies. This film of moisture indirectly destroys the insulation in the apparatus. In the Zeleny electroscope, the film of moisture forms on the surface of the case, amber and of the whole instrument, thus serving as a connecting link between the leaf and the case. The leaf system is thus not well insulated from the rest of the apparatus, leading to unreliable results in the determination of its rate of loss of charge.

This error caused by the variable amounts of moisture in the atmosphere is taken into consideration whenever experiments with electroscopes are performed. The precaution taken consists in determining the natural leak of the instrument at the start of the experiment and subtracting the result from the final result. This method is not very practicable in the case of the Zeleny electroscope in the Philippines when the electroscope is not enclosed in a dry receptacle, although giving good results with the same instrument in the United States, because the frequency of vibration of the leaf is too rapid to be accurately determined. Besides, the period varies from hour to hour, if not within a shorter interval of time. The error, therefore, introduced by the natural leak due to both radiation and moisture, being very variable, cannot be corrected for, especially when as in my case, the experiments last for hours.



# NEWS AND NOTES

## UNIVERSITY CURRENT NEWS

Enrollment in the University of Santo Tomas this school year increased considerably, according to figures released by the Registrar, Atty. Norberto de Ramos, on July 8, when registration definitely closed for the first semester. The total enrollment is 4,894 as compared to 4,063 of last year's, or an increase of 831 students.

Among the different colleges of the University, the College of Medicine leads all others in quota with a total of 1,358 students. The College of Liberal Arts comes next with 850. Although the College of Commerce and Business & Law has only 573 students it has the highest percentage in increase. The College of Law has 516 while Education has 434. The College of Philosophy and Letters admitted 72. Engineering and Architecture and Fine Arts have 309 students.

Increase is also noted in the High School department and the School of Pharmacy. 300 boys and girls have enrolled in the former while Pharmacy has 364. 69 are pursuing Post Graduate courses, 51 others are in the Special courses.

The prestige of the university and its alumni, the ever-increasing facilities offered every year and the improvements in the various departments and colleges have contributed to the increase in enrollment.

## HOLD INAUGURATION OF SCIENCE ACADEMY IN ROME

The reconstituted Pontifical Academy of Sciences was formally inaugurated last June by His Eminence Eugenio Cardinal Pacelli, Papal Secretary of State, acting in the name of His Holiness.

Father Agostino Gemelli, O.F.M., President of the Academy, read an address recalling the munificent gesture of Pope Pius XI who called the most illustrious representatives of the sciences to the "Senate of Sciences," for the sole purpose of promoting scientific progress. This, Father Gemelli said, brings back the glorious days when the Papal Court assembled the most renowned scientists, scholars and artists in the center of the highest knowledge in the interest of the cult of truth. Several among the new Academicians, and these men who are not Catholics or who know God only through natural knowledge, have declared that no laurel or crown so far received has pleased them more than the honor conferred upon them by the Pope, he declared.

Father Gemelli also directed attention to the fact that this year, Pope Pius XI, in his annual Papal Medal, has wished to record the reconstitution of the Academy through the figures of Michaelangelo, Leonardo da Vinci and Volta, three geniuses whom the Holy Father wishes to serve as models for the activity of the Academy. Saying that the

Academicians promise to respond to the Pope's expectations, Father Gemelli concluded with the assertion that, in moments wherein the nations are disturbed by strifes and hatreds, the meeting of men of different countries, different races, different languages and different religions, united by the sole desire to seek the truth is a great warning and the hope of mankind assembled in the peace of justice and the order of truth. Father Gemelli announced the foundation of a prize by Pope Pius XI to be awarded annually by the Academy for some distinguished contribution in the field of science. This year the award is to be given for work in the field of biology.

Dr. Charles Delevallee Poussin, Professor in the University of Louvain, spoke next, giving thanks in the name of the Academicians, who, he said, recognize the more noble aims of the Academy according to the tradition of the Papacy. Along with its scientific aim, he said, the Academy also has its aim of moral and social preservation. Saying that the existence of God and the immortality of the soul are the basis of every moral law and social life, Dr. Poussin declared that he who denies these truths constructs a most cruel doctrine forbidding men to raise their eyes to heaven. Catholic Academicians, he added, could not have a greater honor than the opportunity to render the testimony of their Faith.

Pointing to the assertion made by some that Faith and Science are mutually contradictory, Dr. Poussin said the history of science proves the contrary to be true. There is no possibility of a contradiction between real Science and Faith, because God is the source of both and God cannot contradict Himself, Dr. Poussin pointed out. There are others who object that the Catholic scientist is chained by dogmas and cannot freely seek the truth, he said. This is false, he added, because the Catholic scientist does not fear the truth, but contemplates it, repeating the words of Kepler, who thanked God for the joys granted him in the contemplation of His works.

In fact, Dr. Poussin continued, science is enslaved where God is proscribed. The speaker concluded by recalling the exalting motto of the Academy's insignia, "Deus Scientiarum Dominus" (God, the Lord of Science).

Cardinal Pacelli, responding to these address in the name of the Holy Father, delivered to the Academicians the message which His Holiness would have delivered had he been present.

It must be emphasized that the fact that His Holiness did not take part in the inauguration of the Academy does not mean that the condition of his health is worse. The Holy Father celebrated Mass the morning previous and attended to his usual work, but considering everything, thought it more prudent not to fatigue himself too much. Therefore, he renounced a long-desired pleasure which, at the last moment, seemed imprudent.

#### *Worthy Representatives*

Cardinal Pacelli told the Academicians that Pope Pius XI, being 80 years of age and at the summit of life, desired to give a new proof of the importance he attaches to the divine words concerning the acquisition of knowledge, showing that not only does he not reject science but that

rather he calls it to himself, for he has called to his Academy worthy persons who, by universal consent, are held to represent such high achievements in scientific fields. It is not true, Cardinal Pacelli continued, that Science and Faith are irreconcilable. Rather, he added, the homage of the created intellect to the Creator is never worthier of both than when illuminated by the splendors of science.

The Cardinal Secretary of State then announced that there would be distributed in the name of Pope Pius XI, the Papal Medal, which this year is coined bearing likenesses of three supreme geniuses, Volta, Michaelangelo and Leonardo da Vinci—Volta who accomplished marvelous things in the field of electricity, Leonardo with the universality of his scientific genius, and Michaelangelo, master of the real science of art—Volta, who was a catechist for the children of his parish; Michaelangelo, who erected the dome of St. Peter's Basilica, and Leonardo, who left a legacy for Masses. In these great names, Cardinal Pacelli said, the Holy Father shows the Academicians three highest models, a three-fold most glorious example.

Then followed the distribution of the Papal Medals. When this was accomplished, the members of the Academy sat to hear scientific communications.

#### THE ORIGIN OF THE COSMIC RAY

PROFESSOR ARTHUR H. COMPTON, professor of physics at the University of Chicago, and Dr. P. Y. Chou, of the National Tsing Hua University, Peiping, China, discuss in the current issue of *The Physical Review*, a new hypothesis on the origin of the cosmic ray. It is pointed out that in the present stage of cosmic ray knowledge there is no known act of nature—even the annihilation of the atomic nucleus—which can provide sufficient energy to fit the observed energies of some of the cosmic rays. The only possibility is the primeval explosion that sent worlds and galaxies literally rocking and reeling into space.

Every kind of particle and the packets of energy known as photons would be the débris of such a staggering catastrophe. To account for the known preponderance of electrically charged particles, it suggested that the noncharged photons and neutrons have been lost in space because they could penetrate the magnetic field of stars and galaxies. But these same magnetic fields might trap the particles and so produce the observed particle component of the cosmic rays.

The authors acknowledge the expanding universe theory of Abbé LeMaitre as the inspiration for the new hypotheses of the origin of cosmic rays. This is the first report on the subject to appear for some time. For some years investigators have been content to study and obtain more and more experimental data, leaving the fitting together of the pieces to a later time.

Discussing the high energy of cosmic rays and their apparent origin somewhere out in space, the authors write: "If the cosmic rays come from beyond the Milky Way, at a really typical place in intergalactic space the density of cosmic-ray energy would be of the order of 100 times as great as that of starlight. It is thus apparent that either the source

of the rays must be a radiator which is very powerful compared with stars as a source of light, or the cosmic rays once emitted must be retained by the metagalactic system instead of being lost as is starlight. Although nuclear processes occurring in interstellar space might result in an adequate total energy, it appears that such processes are inadequate to account for the great energies of the individual cosmic-ray particles."

Concerning the trapping of the electrical particles they ask, "Is it possible that electrically-charged rays emitted by the initial explosion may be deflected by stellar or galactic magnetic fields just as a cosmic-ray electron is deflected by the earth's magnetic field? If so, those particles which would be most probably retained by the metagalactic system would be those with the highest ratio of charge to mass in order, electrons, protons, etc., whereas all neutral rays might be forever lost."

Because, on the hypothesis, the cosmic rays would spend much of their lifetime in intergalactic space they should suffer the "red shift" decay of energy in the same way that light does. If this is true the energies of the cosmic rays now striking the earth must be much less than those of the rays in the early history of the earth.

#### A NEW METAGALACTIC CLOUD

WHAT is probably the most extensive "metagalactic cloud" ever discovered, so tremendous that it may easily encompass 50,000 galaxies comparable with our own Milky Way, has been located and photographically studied by astronomers of Harvard University.

Shaped roughly like a narrow stream, it is estimated to be about 50,000,000 light years in length and 20,000,000 light years across. It is more than 100,000,000 light years distant from the earth, however, and despite its great size, its members are visible only through the most powerful telescopes. It is situated near the south pole of the heavens. According to Dr. Harlow Shapley, director of the Harvard Observatory, who announced the discovery, the cloud is of particular interest to astronomers not only because of its tremendous size, but because it is expected to be of much importance in studying the complex space-time-matter relationships in our "immediate" neighborhood, astronomically speaking—that is, out to about 100,000,000 light years. It emphasizes the lack of uniformity in the space distribution of galaxies. Astronomers have for some years been aware of the existence of so-called super-galaxies—clusters big enough to contain several hundred Milky Way systems. Until this most recent find, however, there has been no evidence of galaxies much larger than these—certainly not for any as large as the one just found. The new cloud was discovered on photographic plates taken at the southern station of the observatory during a more or less routine survey of all galaxies brighter than the 18th magnitude. At first it was classified as merely a "major irregularity" in the distribution of faint galaxies in the southern skies. The photographic plates actually show only about 15,000 galaxies, all of them between the magnitude of 16.5 and 18.5, but judging from other super-galaxies it is assumed that many members are too faint to show on the plates and have placed the probable complete census at more than 50,000 galaxies. Astronomically speak-



ing the cloud extends over a region about 40 degrees in length and 15 degrees in width, from near the sky's south pole toward the south galactic pole in Sculptor.

### RADIOACTIVE ELEMENTS

IN a report to the American Physical Society Professor T. R. Wilkins and Dr. W. M. Rayton, of the University of Rochester, present new evidence which helps make clearer the origins of the missing long-lived parents of the actinium series of radio-elements.

Scientific happenings which make it possible to throw light on the problem are that sometimes the change from one element to another is accompanied by a loss of weight and sometimes merely by a loss of electrical charge without the weight loss. The loss of weight occurs when the nucleus of a helium atom, known as an alpha particle, is liberated in the radioactive disintegration. Then, the parent atom drops down two whole numbers in the numerical scale which rates chemical element from hydrogen, at one, to uranium at 92.

When electricity is given off by the emission of an electron the atomic number of the element jumps back up the scale by one unit. Thus Uranium I (92) gives off an alpha particle and becomes Uranium  $X_1$  (90). But Uranium  $X_1$  gives off an electron and becomes Uranium  $X_2$  with atomic number 91. Thus in stepwise fashion, but sometimes up and sometimes down the scale of atomic numbers, go the disintegrations of the heavy radioactive elements, of which the best known is, perhaps, radium with atomic number 88. Common, grey and soft lead is the final offspring of all these spontaneous changes and there are four different kinds of lead; radium lead, thorium lead, actinium lead and just lead. The radium, thorium, and actinium here mean that it is lead which had each of these specific origins. Plain lead merely means that its origin can not be specifically fixed.

The ability of the radioactive atoms to lose or take on weight at various stages means that there will frequently be two or more varieties all having the same chemical properties but slightly different masses even though they may have the same atomic number rating. Thus Uranium  $X_1$  and its three isotopes all have atomic weight of 234. One has an atomic number of 90, another is number 92 and two are number 91.

While chemical methods are not sufficiently exact to permit distinguishing between all these varieties, other methods, and in particular, the range with which alpha particles are emitted, serve as experimental checks.

Drs. Wilkins and Rayton have studied the alpha particle ranges as their method is seeking actinium's "lost parent." The investigation also throws much needed light on the way alpha particles are emitted from the nucleus of atoms; a problem which has bearing on the much-studied and important field of the constitution of the inner cores of atoms.

A previously-unfounded isotope of uranium has been indicated, at least tentatively, which might well serve as the parent for the now-orphaned series of actinium radio-elements.

### OCCUPATIONAL HAZARDS

Lead poisoning, and not silicosis or any of the other occupational diseases, is the chief hazard to the health of workers in industry, according to Dr. William D. McNally, of Rush Medical College, Chicago, who spoke at the Midwest Conference on Occupational Diseases in Detroit. Wherever dusts are found containing lead, whether it be in mines, smelting, in the manufacture of lead pigments, or in the manufacture of storage battery plates, poisoning is certain to result.

Carbon monoxide and fumes from oxides of nitrogen in dynamite explosions were described as other serious industrial health hazards. There are over nine hundred occupations causing injurious effect upon the health of the individuals engaged in them.

Silicosis, caused by inhalation of silica-laden dust, predisposes the lining of the bronchial tubes to attacks of bronchitis. The bronchitis lays a foundation for pneumonia and tuberculosis. Preventive measures must include the examination of every new employee, good ventilation, masks, and the use of wet processes wherever feasible. Post-mortem examinations are advocated in all cases of death where the worker had been engaged in a dusty atmosphere, a microscopical and chemical examination of the lungs will definitely prove whether or not the cause in question is one of silicosis.

Carbon monoxide, one of the most important poisons associated with human life and industry, is without doubt the oldest known poison. Wherever gasoline engines are operated, wherever gas heat appliances are used or wherever there is incomplete combustion of any carbonaceous material, this gas is present. The excellent results obtained in the treatment of carbon monoxide by carbon dioxide and oxygen renders all other methods superfluous.

The danger of inhaling oxides of nitrogen was emphasized because of their delayed action. A workman may leave his job complaining of only a bronchial irritation after inhaling the fumes of a dynamite explosion. Several hours later, his lungs become edematous and death may occur within 24 hours. Danger in the use of solvents, such as benzol, carbon tetrachloride and trichlorethylene, lies not only in industry but in the home as well. Quantities larger than one pint should not be sold to the laity.



## ACKNOWLEDGMENTS

CENTRAL-BLATT and SOCIAL JUSTICE—Vol. XXIX, No. 11 *Have We a "Proletarian" Problem?* (1) by Goetz Briefs, Ph. D.—This article gives the history of the word "proletarian" as a necessary explanation to the understanding of the conditions of the modern proletariat. Ever since the term came into use in ancient Rome the word proletarian seems to have always been applied to a class of "freedom" who, enjoying civic rights fully, nevertheless never enjoyed the advantages of capital whereby they could rise in the social scale by improving their living conditions. *Successful Cooperation Requires Educational Work*, by L. S. Herron. The accomplishments of the Farmers' Union of Nebraska highly speaks of the importance and advantages of an educational program carried out in an industrial system. The author encouragingly presents the story of the Farmers' Union of Nebraska pointing out the outstanding phases of the educational program laid out and actually effected by said Union to promote intelligent cooperation among the farmers.

CENTRAL-BLATT and SOCIAL JUSTICE.—Volume XXIX, No. 12. *Have We a "Proletarian" Problem?* (2) by Goetz Briefs, Ph. D. "What the worker objects to is not his being a wage-earner but the actual implication of wage-earnership." And the worker does

not object to his being a wage-earner provided a just wage be paid to him and his employment be secure. With all these conditions satisfied the wage-earner nevertheless realizes, with a feeling of deep resentment, the socioeconomic factors that prevent him from rising in the social scale. This feeling—this *subjective consciousness* is the quintessence of the proletarian problem—is a problem that European societies have had and are confronting. As to whether the American society has this problem, the author says: '...Werner Sombart was struck by the fact that labor in the United States had developed no inclination towards Socialism, and he was of the opinion that no socialistic creed could gain a hold on the soul of the American worker. Nevertheless Sombart foresaw a change for the worse in these conditions, and predicted that with this change proletarianism and Socialism would rise.'

THE CADECEUS, May 1937—*A Study of Epithelial Odontome Treated in the University Surgical Clinic, Hong Kong.* Dr. William Lai Fock of the Hong Kong University reports a series of 25 cases operated on since 1922, all of which were confirmed histologically to be cases of epithelial odontome.

The clinical picture of the cases may be described as a soft endosteal swelling involving the man-

dible and less often the maxilla, occurring equally in both sexes and usually between the ages of 18 and 50 years. The swelling first appears from 1 to 30 years before the patient seeks admission. It is a very slow growing tumor, taking months or even years to reach a considerable size, causing a gradual expansion of the jaw with a tendency to polycystic formation. This condition if left alone will develop into what is known as fibro-cystic disease of the jaw. Many of the patients complain of toothache at the outset, but pain and tenderness are usually absent from the tumor, though some discomfort may be felt. After operation (excision of the tumor) many cases have tendency to recur.

This article is accompanied by the protocol of all cases cited, some of them bearing photographs of the patients and micro-photographs of the histological sections.

*Fifty Years of Medical Education in Hong Kong.* Such is the theme of a lecture delivered before the Henry Lester Institute of Medical Research, Shanghai, on March 31, 1937, by Dr. Lindsay Ride, Dean, Faculty of Medicine, The University of Hong Kong. With a pleasant, delightful style he proceeds to sketch the historical background of the Faculty of Medicine of the Hong Kong University which is solely responsible for the Medical education in Hong Kong up to the present time. Like any great enterprise, the foundation of a medical college in those days, back in 1887, and under unfavorable circumstances, suffered vicissitudes and handicaps; but after tireless labor of the pioneers, succeeded in erecting buildings, raising funds and estab-

lishing modern methods of medical education.

DOMINICANA, June, 1937.—The excellence of the Eucharist, according to *The Feast of Corpus Christi—Its Prayer* by Lewis Anthony Springmann, O.P., is beautifully epitomized in the prayer sung at the close of Benediction which tells that the Holy Eucharist is a memorial of the Passion, that we are to venerate the sacred mysteries, and that we must ever feel within us the fruit of our veneration.

Men seek an abiding city that is to come, and He has left us a price of our entrance to that lasting city—a memorial of His Passion—to help us. We venerate the Holy Eucharist by receiving the Sacrament, assisting at Mass, or by visiting Christ truly present beneath the species. He left us Himself because He loved us. Love begets a union; in unison there is strength. Our strength onward should be God's love for us and our love for Him.

Two things are proved by Paschal Shaffer in *Mary, Mother and Mediatrix*: (1) that Mary, the Mother of God is also our mother in the truest acceptation of the word; and (2) that Blessed Virgin is the universal dispenser of God's graces, that is, all the graces which God bestows upon men come through Mary as through a channel. In this article it is shown that the Blessed Virgin's complete and close union to Christ was more than a purely corporal one, and that Mary's life was inseparably bound up with His in the three phases of the complete Life of Christ—His Earthly, Glorified and Mystical Life. By showing that the Blessed Virgin is truly

our Mother because of the Extension of the Divine Maternity to include motherhood of Christ's Mystical Body the foundation of calling her the Mediatrix of all graces is established. The two truths are united by Cardinal Lepcier: "Because the Blessed Mother was ordained by God to be the Mother of the Faithful in the order of eternal salvation, it naturally follows therefore that she exercises the function of Mediatrix between God and man."

Man should be charitable and pray—this is the subject of *Brother Could You Spare a Dime or a Prayer*. Corporal almsdeeds should be preferred to those of the spiritual order although prayers are of their nature more noble—in times of hunger, depression or war. Yet paradoxically, it is after all harder to get a prayer than to obtain a corporal donation or a dime. Fr. Urban Corigliano, O.P., also contributes in this number a very inspirational sketch about the life of a great and good woman, a Heroine of Love, Catherine Benincasa, popularly known as St. Catherine of Siena.

CURRENT HISTORY, June, 1937—*America Talks Court*, by Richard L. Neuberger, raps the judicial reform plan of U. S. President Roosevelt to increase the number of Supreme Court Justices to 15 because it will cost a barrel of money. A large number of citizens are opposed to the President's scheme because they claim that the Supreme Court always had consisted of nine members, a number specified in the Constitution, and they believe that the demand for a Constitutional amendment is merely for a constitutional amendment embodying the Pre-

sident's plan.

The general objection seems to be that the Court is a bulwark against hastily-conceived tyrannical majorities. While adherents of the President say that the Court has thwarted the will of the people as expressed at the polls, very few understand the expression used by both sides of the question. There is a confusion as to the meaning and knowledge of such terms as "interstate commerce power," "judicial review," "appellate jurisdiction," and "general welfare clause." The prevailing opinion of the majority is that Americans are indignant over the plan.

*China's United Front* by Frederick V. Field. It is pointed out in this article that movements in China point the way to an internal strength and external peace of that big country. There is a national movement which seeks to embrace practically all groups from left to right within the country against the common foe of Japanese aggression. Negotiations between the Communists and the Kuomintang point to the unification of government power, cessation of Communist propaganda and stoppage of class struggle. These give immeasurable significance and will establish in the near future a way to real Chinese unity, to a frustration of Japanese imperialism in the East, and finally, to the improved welfare of other Far Eastern peoples.

REVISTA DEL COLEGIO DE ABOGADOS DE BUENOS AIRES.—Marza-Abril, 1937.—*Federación argentina de Colegios de abogados*; su organización, funcionamiento y acción interna y externa, por Julio O. Ojea.—La jus-

ticia capitular porteña durante los últimos años del funcionamiento del cabildo (1810-21), por el doctor José M. Saenz Valiente. Este artículo es un capítulo de un libro en preparación sobre la organización y funcionamiento del Cabildo de Buenos Aires durante este periodo. Estudia los siguientes puntos: Los funcionarios judiciales del cabildo.—Los alcaldes ordinarios.—La jurisdicción de los alcaldes.—Los reglamentos de 1812 y 1813 y la competencia de los alcaldes.—Significación y política del cargo.—La jurisdicción rural: los alcaldes de la hemandad.—Atribuciones de los alcaldes de la hemandad.—El debate oral en el procedimiento civil de Alemania por Hans. M. Semon. Estudia los cinco principios básicos del proceso civil alemán, a saber; el principio de la "oralidad;" el de la "intermediación," el de la "publicidad," el de la "iniciativa de las partes" y el de la "disposición de las partes en cuanto a la materia del caso objeto del pleito."—Concepto de la medianería, por Primo Persegani.

REVISTA JAVERIANA, Mayo, 1937.—Orinetaciones. Carta enciclica "Divini Redemptoris" sobre el comunismo ateo. Traducción del R. P. José M. Uria S.J.—Boletín de estudios sismologigos, por

M. M. Navarro Neumann. (Conclusión) Estudio los últimos adelantos en este ramos de la ciencia y la cuenta de los trabajos y observaciones llevadas a cabo en diferentes estaciones sismologicas.

REVISTA FILIPINA DE MEDICINA Y FARMACIA Y "JOURNAL OF THE PHILIPPINE PHARMACEUTICAL ASSOCIATION. Publicación mensual, Manila, Junio, 1937.

EL SANTISIMO ROSARIO, Vergara, Junio, 1937.

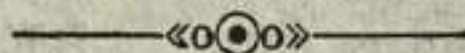
ANNALES DE L'UNIVERSITE DE PARIS, publiées par la societe des amis de l'Universite. Paris, Mai-Juin, 1937.

CLAXON, Publicación mensual, La Habana, Junio de 1937.

WOMAN'S HOME JOURNAL, official publication of the National Federation of Women's Clubs. Manila, July 1937.

REVISTA MUNICIPAL Y DE INTERESES ECONOMICOS, La Habana, Marzo-Abril, 1937.

CULTURA SOCIAL, Manila, Julio, 1937.



## BOOK REVIEWS

**COME TO ME.**—Thoughts for the Time of Communion based on Scriptural Texts. By Mother Mary Philip of the Bar Convent, York, England. New York: P. J. Kenedy & Sons. 192 pages. 12mo. Cloth. \$2.00.

Few of us will ever be as fortunate as Cleophas and his fellow disciple were on a certain road leading into Emmaus, but in her book Mother Mary Philip shows us how we may, in a spiritual sense at least, walk awhile with God, at His invitation, under forty different aspects, ranging from God as our Lord and Master to God as the Pledge of our Salvation. That God is all things to all men is a fact which is too little realized by mankind, but upon which the author throws a new light. In "Come To Me" a small fraction of these things are singled out for discussion and a hint is given of the vast field that is open to us for further meditation.

Each chapter is devoted to God presented in a special aspect. For example, God as our Father or our Rest is taken as the major phrase to be amplified and developed with as many facades and variations as possible. Throughout this development there is a careful and intelligent blending of text with scriptural quotations, which latter sometimes explain, sometimes supplement, but in either case always contribute to the poetic element of the book. Amazing are the ways which God seeks to bring

us to Him by pleading, enticing, promising— by every method, in short, but that of coercion. The author makes it clear that, in spite of the title of her book, it is God who wants to come to us. To the Religious the book will come as an aid in the contemplative life; to the laity it will come as balsam from the hurt of the world, sanctuary from its perils and escape from its woes. Each will find in it what he is seeking.

**TRECE MESES ENTRE LOS ROJOS, o EL COMUNISMO EN CHINA,** por el P. Cipriano Bravo, O.P. Libro es este que a todos recomendamos sin reservas, en la convicción de que cuantos lo leyeren han de dar por bien empleado lo que hicieron por adquirirle. De amena lectura con estilo sencillo y transparente, se desenvuelve entre episodios de subido dramatismo que desde el principio hasta el fin cautivan y mantienen el interés del lector. Su contenido nos ha parecido además altamente útil e instructivo al revelar muchas de las prácticas de la vida comunista, poniendo de manifiesto la enorme distancia que media entre la cruda realidad de sus depravadas costumbres y los principios de sus teorizantes. Las experiencias que relata sobre las intervenciones espiritistas son así mismo de excepcional interés. Durante toda la relación se destaca la figura de su autor y protagonista, P. Bravo, cuya fe y valor en medio de tanta

depravación moral es una prueba de la virtud sobrenatural que ánima y puede infundir la religión católica, única verdadera. Las penalidades y privaciones del cautiverio minaron su robusta naturaleza y actualment el P. Bravo se halla confinado en el Hospital de Santol (Rizal, P.I.) víctima de una afección pulmonar. Esperamos que Dios le

concederá volver pronto a gozar de la salud perdida en el cautiverio. La obra va precedida de una introducción por A. de B. en la que se exponen brevemente las doctrinas y practicas espiritistas y la actitud de la Iglesia católica en esa materia. De venta en la Libreria Católica de la Universidad de Santo Tomas. Precio. 2.00 pesos.

Religious the book will come as an aid in the contemplative life; to the lady it will come as balsam from the hurt of the world, sanctifying from its perils and escape from its woes. Faith will find in it what he is seeking.

TRECE MESES ENTRE LOS  
ROJOS Y EL COMUNISMO EN  
CHINA por el P. Cipriano Bravo

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comendamos sus reservas en la con-  
vicción de que cuando lo leyeren  
han de dar por bien empleado lo  
que hicieron por adquirirlo. De  
amena lectura con estilo sencillo y  
transparente se desenvuelve entre  
espacios de amplio dominio que  
desde el principio hasta el fin con-  
tinen y muestran el interés del  
lector. Su contenido nos ha pare-  
cido sacado admirablemente de las  
prácticas de la vida comunista, po-  
niendo de manifiesto la enorme  
distancia que media entre la cri-  
da realidad de sus doctrinas con-  
tundres y los principios de sus teo-  
rías. Las experiencias que re-  
late sobre las intervenciones capi-  
tistas son así mismo de excep-  
cional interés. Durante toda la  
relación se destaca la figura de su  
autor y protagonista, P. Bravo,  
cuya fe y valor en medio de tanta

Scriptural Texts, BY MOTHER MARY PHILIP OF THE SACRAMENTS, New York, England, New York: P. J. Kennedy & Sons, 192 pages, 12mo. Cloth, \$2.00.

few of us will ever be as for-  
tunate as Cleopatra and his fellow  
disciple were on a certain tour  
leading into Parnassus, but in her  
book Mother Mary Philip shows  
us how we may in a spiritual sense  
at least walk awhile with God as  
His invitation under forty differ-  
ent aspects, ranging from God as  
our Lord and Master to God as the  
Fader of our salvation. The book  
is all things to all men is a fact  
which is too little noticed by man-  
kind, but upon which the author  
throws a new light. In "Come To  
Me," a small fraction of these  
things are singled out for discus-  
sion and a hint is given of the vast  
field that is open to us for further  
meditation.

Each chapter is devoted to God  
presented in a special aspect. For  
example, God as our Father or  
our Host is taken as the major  
phrase to be amplified and deve-  
loped with as many facets and  
variations as possible. Throughout  
this development there is a care-  
ful and intelligent blending of text  
with scriptural quotations, which  
later sometimes explain, sometimes  
supplement, but in either case  
always contribute to the poetic ele-  
ment of the book. Amazing are  
the ways which God seeks to bring





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