JOHNS HOPKINS UNIVERSITY CIRCULARS.

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CALENDAR, 1880-81.

September 21.	**Fifth Academic Year Began.**
September 28.	**Instructions Resumed.**
December 23—Jan. 4.	**Christmas Recess.**
February 22.	**Commemmoration Day.**
April 14—19.	**Spring Recess.**
June 10.	**Term of Instruction Closes.**

CONTENTS.

MEETINGS OF SOCIETIES, Etc.

Scientific. First Wednesday of each month, at 8 P. M. Next meeting, January 5. E. H. Hall, Sec'y.

Historical and Political Science. Third Friday of each month, at 8 P. M. Next meeting, December 17. H. B. Adams, Sec'y.

Metaphysical. Second Tuesday of each month, at 8 P. M. Next meeting, December 14. Allan Marquand, Sec'y.

Philological. First Friday of each month, at 12 M. Next meeting, January 7. M. Warren, Sec'y.

Mathematical. Third Wednesday of each month, at 8 P. M. Next meeting, December 15.

PUBLIC LECTURES.

Prof. Rabillon's Course (in French) on the *Satirists of France* is now in progress in Hopkins Hall, at 5 P. M , on Wednesdays and Saturdays of each week.

A full announcement of the other lectures to be given this year will be made in the next number of the these Circulars.

ENUMERATION OF CLASSES, FIRST HALF-YEAR, 1880-81.

Mathematics. (27 Students.)

Classes meet in Room 16.

Theory of Numbers: PROF. SYLVESTER. Twice weekly, Tuesday and Friday, 1 P. M. (6).

Franklin.	Ladd.	Prentiss.
Hathaway.	Mitchell.	Van Velzer.

Mathematical Seminary: PROF. SYLVESTER and DR. STORY. Third Wednesday of each month, 8 P. M. (14.)

Bissing.	Freeman.	Perry.
Bland.	Hathaway.	Pickle.
Collins.	Ladd.	Prentiss.
Cuykendall.	Mitchell.	Van Velzer.
Franklin.	Norwood.	

Problems in Mathematics: DR. STORY. Once weekly, Thursday, 12 M. (4).

Bissing.	Norwood.
Collins.	Prentiss.

Higher Plane Curves: *Advanced Course:* DR. STORY. Twice weekly, Tuesday and Friday, 10 A. M. (4).

Ladd.	Norwood.
Mitchell.	Prentiss.

Conic Sections: DR. STORY. Thrice weekly, Monday, Wednesday and Friday, 1 P. M. (8).

Collins.	Garthe.	Liebig.
Cuykendall.	Gilman, B. I.	Reese, C. L.
Day, W. C.	Keeler.	

Theory of Functions: DR. CRAIG. Thrice weekly, Tuesday, Thursday and Friday, 5 P. M. (3).

Bissing.	Mitchell.	Van Velzer.

Hydrodynamics: DR. CRAIG. Twice weekly, Tuesday and Thursday, 4 P. M. (6).

Bissing.	Hall.	Prentiss.
Goodnow.	Perry.	Wheeler.

Determinants: DR. FRANKLIN. Twice weekly, Monday and Wednesday, 10 A. M. (9).

Bissing.	Freeman.	Norwood.
Collins.	Gilman, B. I.	Perry.
Fletcher.	Hall.	Wheeler.

Differential Calculus: DR. FRANKLIN. Thrice weekly, Monday, Wednesday and Friday, 11 A. M. (6).

Collins.	Harlan.	Page.
Cuykendall.	Koyl.	Pickle.

Theory of Equations: DR. FRANKLIN. Twice weekly, Tuesday, 12 M., and Thursday, 10 A. M. (5).

Collins.	Garthe.	Reese, C. L.
Cuykendall.	Pickle.	

Physics. (32 Students.)

Classes meet in Rooms 3, 4, 7, 8.

General Physics: DR. HASTINGS. Daily, 10 A. M. (15).

Adkins.	Ebeling.	Robinson, A. J.
Berry,	Ingle.	Robinson, C. H.
Boston.	Johnson.	Stratton.
Day, D. T.	Page.	Wiegand.
Earle.	Price.	Wilson, H. V.

Additional attendants upon Experimental Lectures.

Collins.	Harlan.	Pickle.

Laboratory Work: PROFESSOR ROWLAND. Daily, 9 A. M. to 5 P. M. (6 advanced students.

Barnett,	Freeman,	Koyl,
Fletcher,	Goodnow,	Wheeler,

Electricity and Magnetism: PROF. ROWLAND. (6).

Fletcher.	Goodnow.	Perry.
Freeman.	Koyl.	Wheeler.

Major Course: DR. HASTINGS. Lectures once weekly, Thursday, 1 P. M.; Laboratory work during week, especially Wednesday afternoon. (8).

Bissing.	Day, W. C.	Pickle.
Coale.	Harlan.	Prentiss.
Collins.	Liebig.	Reid.
Cuykendall.		

Laboratory Work: (*Class in General Physics*). DR. HASTINGS. (12).

Boston.	Ebeling.	Robinson, C. H.
Broun.	Johnson.	Stratton.
Day, D. T.	Page.	Wiegand.
Earle.	Price.	Wilson, H. V.

Chemistry. (38 Students.)

Classes meet in Chemical Laboratory.

General Chemistry: Four lectures by PROF. REMSEN, and two examinations by DR. MORSE, weekly, (including Saturday), 9 A. M. (22).

Baden.	Keyser.	Stevens.
Bayley.	Kimball.	Stratton.
Dosh.	Liebig.	Thomas.
Earle.	Mahon, O. L.	Trimble.
Freeman.	Marburg.	Warren, H. C.
Frick.	Price.	Wiegand.
Garthe.	Robinson, C. H.	
Keeler.	Rolando.	

Laboratory Work: PROF. REMSEN and DR. MORSE. Daily. (34).

Baden.	Keeler.	Robinson, C. H.
Bayley.	Keyser.	Stevens.
Broun.	Kimball.	Stokes.
Coale.	Kuhara.	Stratton.
Clark, B.	Liebig.	Thomas.
Day, D. T.	Mahon, O. L.	Trimble.
Day, W. C.	Mahon R. W.	Warren, H. C.
Dosh.	Marburg.	Wiegand.
Earle.	Palmer, C.	Worthington.
Frick.	Palmer, A. G.	Wylie.
Garthe.	Pund.	Young.
Goldsborough.		

Analytical Chemistry: DR. MORSE. Three times weekly, Monday, Thursday and Friday, 10 A. M. (7).

Dosh.	Pund.	Thomas.
Keyser.	Stevens.	Trimble.
Palmer, A. G.		

Biology. (20 Students.)

Classes meet in Biological Laboratory and Lecture Room.

Animal Physiology: PROF. MARTIN. Thrice weekly, Monday, Wednesday and Friday, 11 A. M. (12).

Donaldson.	Keyser.	Reid.
Dosh.	Lockwood.	Rolando.
Hartwell.	Mitsukuri.	Warfield.
Howell.	Moale.	Wilson, E. B.

General Biology: PROF. MARTIN. Thrice weekly, Tuesday, Thursday and Saturday, 11 A. M. (7).

Lockwood.	Reid.	Trimble.
Mitsukuri.	Stevens.	Warfield.
Moale.		

Human Anatomy: DR. WINSLOW, Univ. of Md. Thrice weekly, Tuesday, Thursday and Saturday, 1.15 P. M. (3).

Donaldson.	Howell.	Rolando.

Osteology: Dr. Brooks. Four times weekly, Monday, Tuesday, Thursday and Friday, 9 A. M. (4).

Reid.	Trimble.
Stevens.	Warfield.

Laboratory Work: Prof. Martin, Dr. Sewall and Mr. Sedgwick. Daily, except Saturday. (20).

Clark, B.	Keyser.	Rolando.
Clarke, S. F.	Le Van Bender.	Schimper.
Donaldson.	Lockwood.	Stevens.
Dosh.	Milroy.	Trimble.
Hartwell.	Mitsukuri.	Warfield.
Howell.	Moale.	Wilson, E. B.
Hill.	Reid.	

Theory and Use of Physiological Instruments: Dr. Sewall. Once weekly, Monday, 4 P. M. (7).

Donaldson.	Keyser.	Rolando.
Dosh.	Reid.	Warfield.
Howell.		

Greek. (27 Students.)

Greek Seminary: Prof. Gildersleeve. Twice weekly, Monday and Wednesday, 12 M., Room 13. (13).

Alexander.	Harding.	Short.
Bevier.	Nicolassen.	Spieker.
Burgess.	Norton.	Tidball, C. M.
Fleming.	Seelye.	Tidball, W. J.
Gjellum.		

Lectures on Grammar: Prof. Gildersleeve. Once weekly, Thursday, 12 M., Room 13. (14).

Alexander.	Gjellum.	Short.
Bevier.	Harding.	Spieker.
Burgess.	Nicolassen.	Tidball, C. M.
Cheek, S. R.	Norton.	Tidball, W. J.
Fleming.	Seelye.	

Greek Composition and Translation: Prof. Gildersleeve. Twice weekly, Tuesday and Friday, 10 A. M., Room 13. (15).

Alexander.	Gjellum.	Seelye.
Beadenkopf.	Harding.	Short.
Bevier.	Nicolassen.	Spieker.
Burgess.	Norton.	Tidball, C. M.
Fleming.	Sale.	Tidball, W. J.

Sophocles: *Electra, Antigone:* Prof. C. D. Morris. Four times weekly, Monday, Wednesday, Thursday and Friday, 9 A. M., Room B. (10).

Burgess.	Ingle.	Seelye,
Fleming.	Norton.	Taylor, A. D.
Gordon.	Sale.	Tiffany.
Harding.		

Herodotus: Prof. C. D. Morris. Four times weekly, Monday, Wednesday, Thursday and Friday, 10 A. M., Room B. (6).

Canfield.	Gittings.	Glenn, W. L.
Crutchfield.	Glenn, J.	Miller.

Greek Prose Composition: Prof. C. D. Morris.

Class A. Once weekly, Tuesday, 9 A. M., Room B. (10).

Burgess.	Ingle.	Seelye.
Fleming.	Norton.	Taylor, A. D.
Gordon.	Sale.	Tiffany.
Harding.		

Class B. Once weekly, Tuesday, 10 A. M., Room B. (6).

Canfield.	Gittings.	Glenn, W. L.
Crutchfield.	Glenn, J.	Miller.

Hellenistic Greek: Mr. Cross. Daily, 11 A. M., Room F. (2).

Beadenkopf.	Read.

Latin. (38 Students.)

Latin Rhetoricians: Dr. Warren. Once weekly, Monday, 5 P. M., Room C. (13).

Alexander.	Fleming.	Spieker.
Bevier.	Gjellum.	Thach.
Burgess.	Harding.	Tidball, C. M.
Cheek, S. R.	Nicolassen.	Tidball, W. J.
Derby.		

Terence: Dr. Warren. Once weekly, Wednesday, 4 P. M., Room B. (14).

Bevier.	Fowler.	Spieker.
Burgess.	Gjellum.	Thach.
Cheek, S. R.	Harding.	Tidball, C. M.
Derby.	Nicolassen.	Tidball, W. J.
Fleming.	Sale.	

Tacitus: Dr. Warren. Daily, 11 A. M., Room C. (14).

Adkins.	Ingle.	Sale.
Cheek, S. R.	Kimball.	Taylor, A. D.
Derby.	Leftwich.	Thach.
Gittings.	Miller.	Tiffany.
Gordon.	Patterson.	

Livy: Mr. Stockbridge. Daily, 9 A. M., Room A. (14).

Boston.	Duffy.	Page.
Canfield.	Fels.	Reese, C. L.
Crisp.	Glenn, J.	Reese, R. M.
Cromwell.	Glenn, W. L.	Wilson, H. V.
Crutchfield.	Jones.	

German. (46 Students.)

Gothic: *Heyne's Ulfila:* Mr. Brandt. Once weekly, Thursday, 4 P. M., Room C. (1).

Fowler.

Old High German: Mr. Brandt. Twice weekly, Tuesday and Friday, 4 P. M., Room C. (2).

Bright.	Fowler.

German Seminary: Mr. Brandt. Once weekly, Saturday, 9 A. M., Room A. (17).

Alexander.	France	Prescott.
Berry.	Garthe.	Reese, R. M.
Bowdoin.	Gerke.	Stevens.
Bright.	Johnson.	Wilhelm.
Brinton.	Keeler.	Wilson, H. V.
Ebeling.	McIlwaine.	

Schiller, *Wallenstein:* Mr. Brandt. Twice weekly, Wednesday and Thursday, 11 A. M., Room A. (12).

Bemis.	France.	Keeler.
Berry.	Garthe.	McIlwaine.
Bowdoin.	Gerke.	Reese, R. M.
Brinton.	Johnson.	Wilson, H. V.

German Prose Composition: Mr. Brandt. Once weekly, Monday, 11 A. M., Room A. (16).

Alexander.	France.	McIlwaine.
Berry.	Garthe.	Pund.
Bissing.	Gerke.	Reese.
Bowdoin.	Johnson.	Stevens.
Brinton.	Keeler.	Wilson, H. V.
Ebeling.		

Schiller, *Prosa:* Mr. Brandt. Twice weekly, Tuesday and Friday, 12 M., Room A. (24).

Adkins.	Glenn, J.	Robinson, C. H.
Boston.	Harding.	Short.
Brown.	Jones.	Stratton.
Crisp.	MacClintock.	Thach.
Duffy.	Murray.	Thomas.
Fels.	Palmer, A. G.	Tidball, C. M.
Fleming.	Pickle.	Tidball, W. J.
Frick.	Price.	Trimble.
Gittings.		

Schiller, *Prosa:* Mr. Stockbridge. Twice weekly, Tuesday and Friday, 11 A. M., Room A. (9).

Berry.	France.	McIlwaine.
Bowdoin.	Garthe.	Reese, R. M.
Brinton.	Keeler.	Wilson, H. V.

Goethe, *Egmont:* Mr. Stockbridge. Thrice weekly, Monday, Wednesday and Thursday, 12 M., Room A. (19).

Boston.	Glenn, J.	Price.
Brown.	Jones.	Robinson, C. H.
Crisp.	MacClintock.	Stratton.
Duffy.	Murray.	Thach.
Fels.	Palmer, A. G.	Thomas.
Frick.	Pickle.	Trimble.
Gittings.		

Romance Languages. (26 Students.)

Low Latin: *P. Meyer's Receuil d'anciens textes bas-latins:* Mr. Elliott. Once weekly, Friday, 5 P. M., Room C. (4).

Fay.	O'Connor.
Garner.	Taylor, P. H.

Portuguese: *Camões, Os Lusiadas:* Mr. Elliott. Once weekly, Friday, 3 P. M., Room C. (3).

Fay.	Garner.	O'Connor.

Provençal: *Gaucelm Faidit, Arnaut Daniel:* Mr. Elliott. Thrice weekly, Monday and Wednesday, 11 A. M., and Friday, 4 P. M., Room C. (4).

Fay.	O'Connor.
Garner.	Taylor, P. H.

Italian: *Dante:* Mr. Elliott. Twice weekly, Monday and Wednesday, 12 M., Room C. (6).

Baden.	Linthicum.	Reese, R. M.
Brinton.	O'Connor.	Taylor, P. H.
Liebig.		

Old French: Mr. Marcou. Thrice weekly, Tuesday, Thursday and Friday, 12 M., Room C. (2).

Baden.	Reese, R. M.
Gordon.	Taylor, P. H.

French: *Minor Course:* Mr. Marcou. Daily, 1 P. M., Room C. (8).

Bowdoin.	Glenn, W. L.	Miller.
Brown.	Gordon.	Wilson, H. V.
France.	Jones.	

French: *Reading Class:* Mr. Marcou. Once weekly, Thursday, 11 A. M., Room I. (10).

Baden.	Duffy.	Warfield.
Beadenkopf.	Garthe.	Wiegand.
Boston.	Robinson, C. H.	Wilhelm.
Dosh.		

English. (22 Students.)

Anglo-Saxon: Mr. Cook. Twice weekly, Tuesday and Friday, 11 A. M., Room B. (2).

Alexander.	MacClintock.

Icelandic: Mr. Cook. Thrice weekly, Monday, Wednesday and Thursday, 11 A. M., 123 W. Madison street. (2).

Bright.	Gjellum.

Shakespeare: Mr. Cook. Daily, 3 P. M., Room B. (6).

Boyle.	Cheek, S. R.	Evans.
Cheek, F. J.	Day, D. T.	MacClintock.

Prose Style: Mr. Cook. Once weekly, Saturday, 12 M., Room A. (14).

Bemis.	Jones.	Ramage, B. B.
Campbell.	MacClintock.	Ramage, B. J.
Earle.	Marburg.	Thach.
Ebeling.	Nicolassen.	Wilhelm.
Fels.	O'Connor.	

History and Political Science. (38 Students.)

Modern Absolutism and Revolution: Dr. H. B. Adams. Four times weekly, Monday, Tuesday, Thursday and Friday, 4 P. M., Room A. (33).

Adkins.	Evans.	McIlwaine,
Bemis.	Fels.	Murray.
Berry.	France.	Patterson,
Bowdoin.	Gordon.	Peterson.
Boyle.	Ingle.	Ramage, B. B.
Brinton.	Jameson.	Ramage, B. J.
Campbell.	Johnson.	Robinson, A. J.
Cheek, F. J.	Kimball.	Sale.
Crisp.	Leftwich.	Swift.
Derby.	Mahon, O. L.	Tiffany.
Ebeling.	MacClintock.	Wilhelm.

English Constitutional History: *Stubbs's Select Charters:* Dr. H. B. Adams. Once weekly, Wednesday, 12 M., small lecture room of the Peabody Institute. (13).

Bemis.	Fels.	Leftwich.
Berry.	France.	Ramage, B. B.
Crowe.	Ingle.	Ramage, B. J.
Derby.	Jameson.	Tiffany.
Campbell.		

History of Local Self-Government: Dr. H. B. Adams. Once weekly, Saturday, 10 A. M., Library of the Maryland Historical Society. (30).

Adkins.	Derby.	Leftwich.
Bemis.	Ebeling.	Linthicum.
Berry.	Evans.	Mahon, O. L.
Bowdoin.	Fels.	McIlwaine.
Boyle.	France.	Murray.
Brinton.	Gephart.	Palmer, N.
Campbell.	Goodman.	Ramage, B. B.
Cheek, F. J.	Jameson,	Ramage, B. J.
Crisp.	Johnson.	Robinson, A. J.
Crowe.	Kimball.	Wilhelm.

Political Economy: Dr. H. C. Adams. Four times weekly, Monday, Tuesday, Thursday and Friday, 5 P. M., Room B. (17).

Adkins.	Leftwich.	Ramage, B. B.
Bemis.	Linthicum.	Ramage, B. J.
Brinton.	McIlwaine.	Robinson, A. J.
Campbell.	Mahon, O. L.	Swift.
Jameson.	Murray.	Tiffany.
Johnson.	Palmer, N.	Wilhelm.

Finance: Dr. H. C. Adams. Once weekly, Wednesday, 4 P. M., Room A. (15).

Adkins.	Kimball.	Murray.
Bemis.	Leftwich.	Palmer, N.
Brinton.	Linthicum.	Robinson, A. J.
Campbell.	McIlwaine.	Tiffany.
Jameson,	Mahon, O. L.	Wilhelm.
Johnson.		

In addition to the above classes, a meeting is held once weekly, Wednesday, 5 P.M., in room A, for the discussion of special themes in Political Economy.

Logic and Psychology. (13 Students.)

Advanced Logic: Mr. Peirce. Thrice weekly, Tuesday, Thursday and Friday, 9 A. M., Room C. (7).

Bissing.	Ladd.	Mitchell.
Franklin.	Marquand.	Prentiss.
Gilman, B. I.		

Elementary Logic: Mr. Peirce. Twice weekly, Monday and Wednesday, 9 A. M., Room C. (5).

Bissing.	Robinson, A. J.	Wilhelm.
Howell.	Short.	

Psychology: Dr. Marquand. Thrice weekly, Tuesday, Thursday, and Friday, 12 M., Hopkins Hall Annex. (4).

Brinton.	Leftwich.
Howell,	Robinson, A. J.

Physiography.

Dr. Clarke. Thrice weekly, Monday and Wednesday, 11 A. M., and Saturday, 10 A. M., Room G. (15).

Boston.	Earle.	Jones.
Canfield.	Fels.	Pund.
Cromwell.	Frick.	Reese, C. L.
Crutchfield.	Glenn, J.	Robinson, C. H.
Duffy.	Glenn, W. L.	Stratton.

Elocution.

Mr. Woodworth. Daily, 9 A. M., Hopkins Hall. (16).

Beadenkopf.	Gjellum.	Mahon, O. L.
Bemis.	Johnson.	Mitchell.
Brinton.	Kimball.	Murray.
Duffy.	Leftwich.	O'Connor.
Fels.	MacClintock.	Wilhelm.
France.		

HOURS FOR LECTURES AND RECITATIONS, FIRST HALF YEAR, 1880–81.

HOURS	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
A. M. 9	Chemistry. (Remsen.) Sophocles. (Morris.) Livy. (Stockbridge.) Logic: Elementary. (Peirce.) Osteology. (Brooks.)	Chemistry. (Remsen.) Greek Prose. (Morris.) Livy. (Stockbridge.) Logic: Advanced. (Peirce.) Osteology. (Brooks.)	Chemistry. (Morse.) Sophocles. (Morris.) Livy. (Stockbridge.) Logic: Elementary. (Peirce.) Physics: Major. Laboratory work, 9 A. M. to 5 P. M. (Hastings.)	Chemistry. (Remsen.) Sophocles. (Morris.) Livy. (Stockbridge.) Logic: Advanced. (Peirce.) Osteology. (Brooks.)	Chemistry. (Remsen.) Sophocles. (Morris.) Livy. (Stockbridge.) Logic: Advanced. (Peirce.) Osteology. (Brooks.)	Chemistry. (Morse.) German Seminary. (Brandt.)
10	Physics. (Hastings.) Herodotus. (Morris.) Determinants. (Franklin.) Analyt. Chemistry. (Morse.)	Physics: Experimental Lecture. (Hastings.) Greek Prose. (Morris.) Adv. Higher Pl. Curves. (Story.) Greek Exercise. (Gildersleeve.)	Physics. (Hastings.) Herodotus. (Morris.) Determinants. (Franklin.)	Physics. (Hastings.) Herodotus. (Morris.) Theory of Equations. (Franklin.) Analyt. Chemistry. (Morse.)	Physics: Experimental Lecture. (Hastings.) Herodotus. (Morris.) Adv. Higher Pl. Curves. (Story.) Greek Exercise. (Gildersleeve.) Analyt. Chemistry. (Morse.)	Local Self Gov't. (H. B. Adams.) Teachers' Class. (Morris.) Physiography. (Clarke.)
11	Animal Physiology. (Martin.) German: Major. (Brandt.) Tacitus. (Warren.) Mechanics. (Story.) Calculus. (Franklin.) Hellenistic Greek. (Cross.) Provençal. (Elliott.) Icelandic. (Cook.) Physiography. (Clarke.)	General Biology. (Martin.) German: Major. (Stockbridge.) Tacitus. (Warren.) Physics: Minor. Laboratory work 11 A. M. to 5 P. M. (Hastings.) Hellenistic Greek. (Cross.) Anglo-Saxon. (Cook.)	Animal Physiology. (Martin.) German: Major. (Brandt.) Tacitus. (Warren.) Calculus. (Franklin.) Hellenistic Greek. (Cross.) Provençal. (Elliott.) Icelandic. (Cook.) Physiography. (Clarke.)	General Biology. (Martin.) German: Major. (Brandt.) Tacitus. (Warren.) Mechanics. (Story.) Hellenistic Greek. (Cross.) French: Reading Class. (Marcou) Icelandic. (Cook.)	Animal Physiology. (Martin.) German: Major. (Stockbridge.) Tacitus. (Warren.) Calculus. (Franklin.) Hellenistic Greek. (Cross.) Anglo Saxon. (Cook.)	General Biology. (Martin.)
M. 12	Greek Seminary. (Gildersleeve.) German: Minor. (Stockbridge.) Italian. (Elliott.) Electricity and Magnetism. (Rowland.)	German: Minor. (Brandt.) French: Major. (Marcou.) Theory of Equations. (Franklin.) Electricity and Magnetism. (Rowland.) Psychology. (Marquand.)	Greek Seminary. (Gildersleeve.) German: Minor. (Stockbridge) Italian. (Elliott.) Electricity and Magnetism. (Rowland.) Select Charters. (H. B. Adams.)	Greek Grammar. (Gildersleeve) German: Minor. (Stockbridge.) French: Major. (Marcou.) Math. Problems. (Story.) Psychology. (Marquand.)	German: Minor. (Brandt.) French: Major. (Marcou.) Electricity and Magnetism. (Rowland.) Psychology. (Marquand.)	English Prose Style. (Cook.)
P. M. 1	French: Minor. (Marcou.) Conics. (Story.)	French: Minor. (Marcou.) Theory of Numbers. (Sylvester.)	French: Minor. (Marcou.) Conics. (Story.)	French: Minor. (Marcou.) Physics: Major. (Hastings.)	French: Minor. (Marcou.) Conics. (Story.) Theory of Numbers. (Sylvester.)	
2						
3	Shakespeare. (Cook.)	Shakespeare. (Cook.)	Shakespeare. (Cook.)	Shakespeare. (Cook.)	Shakespeare. (Cook.) Portuguese. (Elliott.)	
4	Modern History. (H. B. Adams.) Physiol. Instruments. (Sewall.)	Modern History. (H. B Adams.) Hydrodynamics. (Craig.) Old High German. (Brandt.)	Finance. (H. C. Adams.) Terence. (Warren.)	Modern History. (H. B. Adams.) Hydrodynamics. (Craig.) Gothic. (Brandt.)	Modern History. (H. B. Adams.) Provençal. (Elliott.) Old High German. (Brandt.)	
5	Political Economy. (H. C. Adams.)	Political Economy. (H. C. Adams.) Theory of Functions. (Craig.)	Political Economy. (H. C. Adams.)	Political Economy. (H. C. Adams.) Theory of Functions. (Craig.)	Political Economy. (H. C. Adams.) Theory of Functions. (Craig.) Low Latin. (Elliott.)	

Public Lectures will be given in Hopkins Hall, daily at 5 P. M., after January 1, 1881.

SYNOPSIS OF THE RECENT SCIENTIFIC JOURNALS

Published Here.

American Journal of Philology. Edited by PROFESSOR GILDERSLEEVE. *Vol. I. No. II.*

Article I.—Etymological and Grammatical Notes.—By F. D. ALLEN.

The words discussed are: (1) *τηλουρός*, which is decided to be a compound of *ὅρος, οὖρος*, in the sense of *watcher, looker*, like *κηπουρός*, and so meaning "watching from afar," "looming up in the distance." (2) Θεωρός, from *θέα* and *ὥρα*, meaning probably "onlooker at a spectacle." (3) The appearance of the digamma in *ἐποίησε* in a recently discovered Argive inscription. (4) *δαίφρων*, which is deduced from *δαΐς*, "torch," and receives the interpretation "fiery-hearted," "gallant." (5) Siremps, explained as equivalent to *si rem eampse*, "thus in very fact." (6) Macte, which is supposed to be *macte*, an adverb, when joined with *esto*, and *macte*, a vocative, when without *esto*. (7) Temperare, the meaning of which, "restrain," "keep in bounds," is deduced, after Usener, from *tempus*, connected with *templum* in its augural sense, "space marked out." (8) Intrare, penetrare, which are derived from noun-stems *intero, penetro*—as *superare* from *supero*.

Article II.—On Recent Investigations of Grimm's Law.—By H. C. G. BRANDT.

The law is restated with the aid of the symbols *x. y. z.* in three formulas. It is claimed that the use of symbols necessitates inquiry into their exact phonetic value, too much neglected when significant letters are used. This is particularly true of x, generally called "aspirate;" y is always the sonant stop, z the surd. For Parentspeech x the value of b' is claimed in accordance with Ellis' observation and Sievers' theory. The groups of languages, which Grimm's Law affects, are best represented by Parentspeech, General Teutonic and High German; not by Sanskrit, Gothic, etc. To the opinion that Sanskrit must show the primitive sounds, was due the first large class of exceptions to the formula Prsp. x > G. T. y > H. G. z. Grassman showed that Sanskrit, Slavic, etc., had shifted to y, and that the formula stands without exception.

The rest of the paper is taken up with Verner's Law, which explains the second class of exceptions, supposed to be such from an undue importance attached to Gothic sounds. The formula in question is: Prsp. z > G. T. x > H. G. y. It seemed to run Skr. z > G. T. y > H. G. z. Verner discovered that the occurrence of both x and y in the second group was due to a difference in the primitive accent. When x stood in the accented syllable it was preserved; if it stood anywhere else, it passed into y already in the G. T. period. Both this y and the one which came from Prsp. x shifted then to H. G. z. Hence there was really no exception to Grimm's Law, but when G. T. x stands in originally unaccented syllables the formula runs: Prsp. z > G. T. x > y > H. G. z as shown by Prsp. patar > G. T. fadhar > fadar > H. G. vater.

Article III.—On the Principles of Orthography of French Verbs ending in -eler and -eter.—By B. F. O'CONNOR.

The writer has collected a complete list of such verbs: and, while admitting that present usage presents inexplicable anomalies, thinks that the main determining factor was etymology: and that the concluding consonant before *e* mute should be doubled in all those verbs which are derived from Latin verbs having *ll* or assimilated *tt* in the infinitive, or from Latin double-diminutives, or feminine nouns: while all others should be written with *è* before the mute *e*.

Article IV.—A Critical Examination of an Edition of Xenophon's Oeconomicus by K. Lincke.—By C. D. MORRIS.

It is shown that the editor has rejected nearly a quarter of the traditional text. The reason which chiefly induced him to make such large excisions appeared to be an impression that the discourse of Socrates with Ischomachus, which occupies the latter portion of the book, is to be regarded as the fulfilment by Socrates of his promise to help his friend Critobulus in his efforts to improve his estate. It was shown that no such conclusion is justified by the words of the dialogue. The chief objections alleged by Lincke against the passages he expels from the text were then stated; and it was shown that neither on grounds of consistency and symmetry, nor on those of phraseology and style, is there any adequate reason for subjecting the text to such violent and arbitrary mutilation. Passages were cited from August Boeckh and Leonhard Spengel in condemnation of this tendency to *ἀθέτησις*, which was regarded as far too prevalent among scholars of a certain type.

Article V.—On the Fourth Play of the Tetralogy.—By M. W. HUMPHREYS.

The writer examines minutely the metrical structure of the Cyclops and the Alcestis, and shows that there was a style of versification which was free from the established licenses of Comedy, while it yet was less rigorous than that appropriated to Tragedy, and which was adapted to what the writer calls a *romance drama.* He uses the positions thus gained to determine the character of the play to which the recently published fragment of Euripides must have belonged. The fragment is quoted at length and some conjectures offered and discussed.

SAMUEL GARNER *contributes a note on the so-called "Subjonctif Dubitatif," je ne sache pas.*

The conclusion reached is that *sache* is not here really a subjunctive at all, but that it is phonetically possible as an indicative. The author believes that there are two inflections of the present indicative of *Savoir:* one coming directly from the Latin, *je sache, tu saches, &c.;* and a second later one of purely French formation, *je sais, tu sais, &c.*

The Reviews and Book Notices, contain: Reviews of *Skeat's Etymological Dictionary*, by A. S. COOK, *and of Mallery's Sign Language among the North American Indians*, by C. H. TOY. A. M. ELLIOTT contributes a *Statement of American Publications in Romance Philology, for 1879.*

Reports are given of the Zeitschrift der Deutschen Morgenländischen Gesellschaft, xxxiii.; Journal Asiatique, April, 1879; Germania, xxiv.; Englische Studien, i.; Revue de Philologie, iv., 1; Zeitschrift für Romanische Philologie, iii, 4; Rheinisches Museum, xxxv.; and Philologus, xxxviii., 3, 4.

Vol. I., No. III.

Article I.—On Verrius Flaccus, by H. NETTLESHIP.

An account is given of what is known of Verrius Flaccus, (the author of "the first Latin Dictionary ever written"), and of what he has suffered at the hands of his epitomator, Pompeius Festus, and of Paulus Diaconus, who in a similar way cut down Festus. The bulk of the present article is devoted to an attempt to show, with greater exactness than had been done by O. Müller, the character of the original work of Verrius Flaccus, and the way in which it is probable that it was made up, and to what extent his citations are due to his own researches; but chiefly to point out that "Verrius arranged his instances under each letter in successive series, each of which contained glosses headed by citations from the same author." A second article is promised in which the attempt will be made to show how we may get at a still larger amount of the work of Verrius Flaccus than is contained in the epitomes of it, by scrutinizing the quotations in Quintilian, Pliny, Macrobius, &c.

Article II.—History of 'Coincide' and 'Coincidence.'—By H. E. SHEPHERD.

The introduction of the words *coincide* and *coincidence* into the English language is traced historically. Quotations are made from various writers, beginning with Roger Bacon, which indicate that the word was first coined by the philosophical writers of the middle age; that it passed from their use into the vocabulary of learned writers of the 17th century and was adopted by the mathematicians to represent the old *congruens, congruere;* and that finally its popular use was confirmed by the *coincident* deaths of Adams and Jefferson, on July 4, 1826.

Article III.—The 'Ablaut' of Greek roots which show variation between ε and ο.—By M. BLOOMFIELD.

The paper contains 46 pages, and is divided into five sections. After a brief introduction, in which are stated the most recent opinions of German scholars on the influence of accent, the existence of nasal vowels, and the nature of palatal consonants, with references to the chief works embodying them, the first section points out the inconsistency which is unavoidable if the variations of the roots in question are to be accounted for by an assumed *guna*, and that the facts force us to admit the existence in the earliest times of "a root-system consisting of three forms, two strong ones and one weak one." The second section treats of the important part played by nasal vowels in Greek words. The third section discusses the variation of roots consequent upon the palatalization of original gutturals. The fourth section shows the way in which the original Indo-European accent made itself felt in the forms taken by roots. The fifth section classifies Greek words, verbs and nouns, according as they are regularly made from one or other of the forms of 'ablaut.'

Article IV.—Logical Consistency in views of Language.—By W. D. WHITNEY.

It is shown that, from the two fundamental facts, that languages are different and that the particular language any man learns is determined for him by the circumstances of his birth, it follows by necessity: (1) That there is no necessary connection between a conception and the word which denotes it: (2) That human language is essentially different from the sounds uttered by the lower animals: (3) That the study of language belongs to the class of historical not physical sciences: (4) That in these facts lies the value of the study of language as an aid to ethnology. Valuable remarks are made also on the historical development of languages, and on what the question as to the origin of language, considered as a scientific one, really implies; and the article concludes with a defence of the classification of language with other social institutions.

The *Reviews and Book Notices* contain an Account, by W. I. KNAPP, of the *Catalogue of the Spanish Library*, bequeathed by George Ticknor to the Boston Public Library; a notice, by C. R. LANMAN, of various books, recently published, concerning Oriental studies, and among them of *Professor Whitney's Sanscrit Grammar;* an account, by M. WARREN, of *Schroeder's and Sonennschein's* rival publications of the emendations of *Plautus*, found in MS. in Bentley's copies in the British Museum; a review, by FRANCIS BROWN, of "*The Origin and Growth of the Psalms*," by by the late Professor T. C. Murray.

Reports are given of Mnemosyne, vii. 3 and 4; Anglia, ii.; Revue de Philologie, iv. 2; Neue Jahrbücher, f. Philol. u. Paed., 1879, parts 9–12; Hermes, 1880, part 1.

American Chemical Journal. Edited by PROFESSOR REMSEN. *Vol. II. No. 2. June, 1880.*

Article I.—On the Determination of Albuminoids in Hay and Coarse Fodder, by H. P. ARMSBY.

For the purpose of determining the value of a feeding-stuff it is common to estimate the quantity of the albuminoid nitrogen contained in it. No good method has hitherto been known for distinguishing between non-albuminoid and albuminoid nitrogen. The author describes a satisfactory method in this article.

Article II.—Researches on the Substituted Benzyl Compounds.—Parachlorbenzyl Compounds, by C. L. JACKSON and A. W. FIELD.

This article contains descriptions of the methods of preparation and the properties of a number of new derivatives containing the parachlorbenzyl group.

Article III.—On the Action of Hydrochloric Acid and of Chlorine on Acetobenzoic Anhydride, by W. H. GREENE.

It is shown that acetobenzoic anhydride prepared by the action of benzoyl chloride on sodium acetate is identical with the product obtained as a result of the action of acetyl chloride on sodium benzoate. Both substances act in exactly the same way towards hydrochloric acid and chlorine. With the former reagent they yield acetyl chloride, acetic acid, benzoyl chloride and benzoic acid. With chlorine the products are acetyl chloride, chloracetic acid, benzoyl chloride and o-chlorbenzoic acid.

Article IV.—On the relative Densities of permanent Gases at high Temperatures, by J. M. CRAFTS.

The remarkable results recently obtained by Victor Meyer in experimenting upon chlorine led the author to repeat the experiments in a modified form. Instead of determining the specific gravity of chlorine when liberated from a solid chloride, he determined the specific gravity of the free gas at high temperatures, and finds that it is normal. This indicates a very marked difference in conduct between free and nascent chlorine.

Article V.—The Vapor Density of Iodine, by J. M. CRAFTS and F. MEIER.

V. and C. Meyer in their experiments found that at high temperatures iodine vapor has an abnormal density, being about two-thirds the normal. The authors have found that at a temperature of 1470° the density is only 0.58 of the normal instead of two-thirds. They conclude that the vapor density of iodine compared with air diminishes *progressively* with the increase of temperature between about 600° when it is still normal, and about 1470° when it reaches the value above indicated.

Article VI.—On the Oxidation of Substitution Products of Aromatic Hydrocarbons.—VI. Experiments with Mesitylene, by L. B. HALL and IRA REMSEN.

In previous papers it has been shown that whenever an acid group occupies the ortho position with reference to an oxidizable group the latter is protected from the action of certain oxidizing agents. In this paper a case is examined in which one acid group occupies the ortho position with reference to two oxidizable groups in the same compound. It was thought that both the latter groups would be protected, but the experiments thus far performed seem to indicate that this is not true. The experiments are to be continued, however, and it is hoped that the question left open may receive a final answer in the immediate future.

Brief Review of the most important changes in the Industrial Applications of Chemistry within the last few years. (*Continued.*)
Professor Mallet in this report, under the head of "Materials used as Food," speaks of improvements in connection with the chemistry of *Bread, Meat, Meat Extracts, Preserved Vegetables, Butter and Cheese, Sugar, Wine, Beer, Distilled Spirits, Vinegar, Artificial Flavoring Essences*, and *Artificial Mineral Waters.*

The remainder of the number is made up of Notes, under which appear: *On the reversal of the direction of rotation caused by ordinary malic acid by a simple change in the concentration*, by G. H. Schneider; *The Alkaloids*, by A. Ladenburg; *On the gases retained by occlusion in aluminium and magnesium*, by M Dumas; *The Research Fund in England.*

Vol. II. No. 3. June. 1880.

Article I.—On the Density of the Vapors of some Ammonium Compounds, by W. G. MIXTER.

It is shown that ammonium acetates and ammonium benzoate dissociate completely into ammonia and the respective acids when heated under low pressures. $2NH_3SiF_4$, NH_3BF_3, and $2NH_3SnCl_4$, dissociate at temperatures above 300° into ammonia and the respective compounds of fluorine and chlorine.

Article II.—Researches on the Substituted Benzyl Compounds: Parachlorbenzyl Compounds, by C. L. JACKSON and J. FLEMING WHITE.

This paper is a continuation of the one of the same title in the foregoing number of the Journal.

Article III.—Preliminary Note on the Synthesis of Methylconine and Constitution of Conine, by ARTHUR MICHAEL and CHARLES GUNDELACH.

A base isomeric with conine was obtained by heating normal butylidene chloride (CH_3—CH_2—CH_2—$CHCL_2$) with alcoholic ammonia. By the action of an alcoholic solution of methylamine on normal butylidene chloride a base was obtained which appears to be identical with natural methylconine.

Article IV.—1. On a new Variety of Tetrahedrite, by F.W. CLARKE and MARY E. OWENS. *2. Specific Gravity Determinations*, by F. W. CLARKE.

Article V.—Concerning Iodine, by VICTOR MEYER.

The author states that by a modification of the method of heating originally employed by him he has succeeded in reaching a materially higher temperature, and that the vapor density of iodine at this point agrees very closely with the value calculated for I.

Article VI.—On the Determination of Barium as Chromate, by H. N. MORSE.

Frerichs states that the presence of acetic acid is a necessary condition to the complete precipitation of barium as chromate. This statement the author finds to be correct, but the further statement that barium chromate may be washed with dilute acetic acid was found to be incorrect. It was shown that barium chromate cannot be washed with even the dilutest solutions of acetic acid without loss. A further result established by the experiments undertaken by the author is that, if a small quantity of chromate of potasium is added barium chromate may be washed with quite concentrated solutions of acetic acid without passing into solution.

Article VII.—On A-Toluenedisulphonic Acid and its Derivatives, by C. FAHLBERG.

Toluenedisulphonic acid is prepared, on the one hand, by treating paratoluenesulphonic chloride with sulphuric acid, and, on the other hand, by treating orthotoluenesulphonic acid with sulphuric acid. This shows that it contains one sulpho-group in the para and one in the ortho-position with reference to methyl. By oxidation of the amide of the acid with potassium permanganate a substance belonging to the class of sulphinides, viz: $C_6H_3\left\{\begin{matrix} CO\text{—}_1 \\ SO_2NH \\ SO_2NH_2 \end{matrix}\right.$ was obtained together with the dipotassium salt of disulphobenzoic acid, $C_6H_3\left\{\begin{matrix} COOH \\ SO_2OK \\ SO_2OK \end{matrix}\right. + H_2O$. From both of these products, by fusion with potassium hydroxide, dioxybenzoic acid was obtained, and from this, by simply heating, resorin.

Report on the Progress of Analytical Chemistry, by H. N. MORSE.

Report on Progress in Physiological Chemistry, by R. H. CHITTENDEN.

Reviews of Post's "*Grundriss der chemischen Technologie*," and of Girardin's "*Lêcons de Chimie élémentaire appliqué aux Arts Industriels*, by J. W. M.

The number is closed by a list of *Recent Publications relating to Chemistry.*

Vol. II. No. 4. October, 1880.

Article I.—Researches on the Complex Inorganic Acids, by WOLCOTT GIBBS.

This paper is a continuation from p. 217, vol. I. It contains the results of a series of laborious examinations of the complicated *phospho-tungstates*. Details in regard to the methods of preparation, the properties and analytical methods employed are given. In this installment of the memoir there are described especially members of the twenty-four-atom series and of the twenty-two-atom series. The fundamental acid of the former series is 24 WO_3, P_2O_5, 6 H_2O, + 47 aq., that of the latter series 22 WO_3, P_2O_5, 6 H_2 O + 45 aq.

Article II.—On the Detection and Determination of Arsenic in Organic Matter, by R. H. CHITTENDEN and H. H. DONALDSON.

In the process described, which is a modification of that first employed by Gautier, the features of special advantage are: extreme accuracy, great delicacy, and the use of but three chemicals, nitric acid, sulphuric acid, and zinc. A simple form of the Marsh apparatus is recommended which, it is claimed, appears to combine all the essentials of a perfect apparatus. The presence of organic matter, according to prevalent opinion, interferes with the test for arsenic by Marsh's method. The authors show that this is not true. A number of quantitative experiments were made to determine the delicacy and the accuracy of the new method and these gave very satisfactory results.

Article III.—Estimation of Sulphur in illuminating Gas by burning in Oxygen, by W. G. MIXTER.

A quantity of the gas measured by a dry meter is burned in a large glass vessel, which is kept cool during the operation. The products of combustion are afterwards treated with bromine and then washed out into an appropriate vessel, evaporated to a small volume, and the sulphuric acid determined as barium sulphate.

Article IV.—A Synthesis of Water for a Lecture Experiment, by W. G. MIXTER.

Article V.— Tubulated Crucible for use in estimating volatile Products of Ignition, by F A. GOOCH.

This paper needs the accompanying drawing to make it clear, and is not suitable for extraction.

Article VI.—Researches on the Substituted Benzyl Compounds:—On Paraiodbenzyl Compounds, by C. L. JACKSON and C. F. MABERY.

The compounds described in this paper are similar to those described in the two preceding numbers, differing from them in containing iodine in the benzene-nucleus instead of chlorine. The properties and methods of preparation of a number of these compounds are given in detail.

Article VII.—Chloro-nitro-phenetol, by EDWARD J. HALLOCK.

Chloro-nitro-phenetol is best prepared by treating phenetol first with a mixture of potassium chlorate and hydrochloric acid, and the chlorophenetol thus obtained with concentrated nitric acid.

Brief Review of the most important changes in the Industrial Applications of Chemistry within the last few years—(Continued), by J. W. MALLET.

The subjects taken up in this report come under the general heading—

"Materials and Processes connected with Clothing." The subheadings are: *General Chemical Treatment of Textile Materials; Bleaching, including Manufacture of Chloride of Lime; Preparation of Dye Stuffs; Artificial Coloring Matters; Mordants; Dyeing; Calico-Printing; Tanning; India Rubber; Gutta-percha, etc.*

Report on Progress in Physiological Chemistry, by R. H. CHITTENDEN.—

The Subsection of Chemistry at Boston.

A letter giving a brief account of the proceedings of the Subsection of Chemistry of the American Association for the Advancement of Science at the meeting held at Boston, in August, 1880. By F. W. Clarke.

Ozone in the Air, by E. SCHÖNE.

Vol. II. No. 5. November, 1880.

Article I.—Researches on the Complex Inorganic Acids, by Wolcott Gibbs.

The *twenty-atom series* of phospho-tungstates is first considered, an example of which is the normal barium salt.

$$20\ WO_3\ P_2\ O_5.\ 6\ BaO + 48\ aq.$$

Of the *eighteen-atom series* the potassium salt $18\ WO_3\ P_2\ O_5.\ 6\ K_2O + 23$ aq., is a good example. Then follow detailed accounts of representatives of the *sixteen-atom series* and the *fourteen-atom series.*

The arsenio-tungstates, as far as examined, correspond in a general way to the phospho-tungstates, though they appear to be, as a rule, less well-defined than these last.

The general results of the investigation of the phospho-tungstate may be stated briefly thus:

1. The phospho-tungstates form a series of which the lowest term probably contains six atoms of tungstic to one of phosphoric oxide, and the highest, twenty-four atoms of tungstic to one of phosphoric oxide.

2. At least the greater number of phospho-tungstates contains an even number of atoms of tungstic oxide. The homologizing term for these cases is therefore $2\ WO_3$.

3 The highest number of atoms of base observed in any case is six (old style), which implies that the acid contains twelve atoms of hydroxyle.

4. In all cases observed the number of atoms of hydroxyl replaced by a monatomic metal is even.

5. One instance occurs in which two acid phospho-tungstates of different orders appear to unite to form a definite compound; but this case admits of a different explanation.

6. In all phospho-tungstates studied the number of atoms of base or of hydroxyl is more than sufficient to saturate the phosphoric oxide present, if we admit that the acid is 12-basic. At least a part of the hydroxyl or base must therefore be united to tungstic oxide.

Article II.—Estimation of Alkaloids by Potassium Mercuric Iodide, by Albert B. Prescott.

In 1862 F. F. Mayer introduced into use a standard solution of mercuric iodide with excess of potassium iodide, in a method for the volumetric determination of the chief natural alkaloids. The method was not, however, found to give uniformly satisfactory results, and the author has, from time to time, with the aid of students of the University of Michigan, endeavored to render it more precise by investigating the nature of the precipitates formed with different alkaloids, and determining the best conditions for effecting the precipitation.

Article III.—On the Ethers of Uric Acid:—Dimethyluric Acid, by H. B. Hill and C. F. Mabery.

Dimethyluric acid was made by heating diplumbic urate with methyl iodide. It is a crystallized substance. It yields salts, several of which are prepared and examined. By treatment with hydrochloric acid it breaks up according to this equation:

$$C_5H_2\ (CH_3)_2\ N_4O_3 + 5\ H_2O = 3\ CO_2 + NH_3 + 2\ CH_3NH_2 + C_3\ H_5\ NO_2.$$

Glycocol.

Oxidized with nitric acid it yields methylalloxan and methylurea.

As one inference from their experiments, the authors say: "It has been shown that the two hydrogen atoms of uric acid which are replaced in the formation of salts are directly connected with two different nitrogen atoms; furthermore, when methyl groups are introduced in the place of these hydrogen atoms, that two other hydrogen atoms may then be replaced by metals. The only simple explanation of this behavior would seem to be that the four hydrogen atoms of uric acid are attached to four different nitrogen atoms, and that only two of these hydrogen atoms can be replaced at the same time by strongly basic radicals."

Article IV.—Researches on the Substituted Benzyl Compounds:—Orthobrombenzyl Compounds, by C. L. Jackson and J. Fleming White.

The compounds described in this paper are orthobrombenzyl alcohol, $C_6H_4\ BrCH_2OH$; orthobrombenzyl cyanide; orthobromparatoluic acid, $C_6H_4\ BrCO_2H$ and its salts; the sulphocyanate; and orthobrombenzylamines.

Article V.—The Constitution of the Tartrates of Antimony, by F. W. Clarke and Helena Stallo.

It is shown that the free acid corresponding to tartar-emetic undergoes decomposition very easily and yields orthoantimonious acid Sb $(OH)_3$. From this fact the authors are inclined to think that the commonly accepted formula for tartar-emetic might better be changed to $C_2H_2\ (OH)_2 < {CO_2 \atop CO_2} > Sb\ (OK)$. This formula does away with the necessity of assuming the presence of the antimonyl group SbO in the salt.

Article VI.—On the Relative Stability of Certain Organic Salts, by Miles Beamer and F. W. Clarke.

The barium salts of methyl, ethyl, propyl, isopropyl, isobutyl and amylsulphuric acids were subjected to the same gradual increase in temperature and the extent and rate of decomposition of each noted. From the experimental data the conclusion is drawn that with the compounds of higher molecular weight, decomposition begins more slowly, but proceeds farther, than with the lower salts of the series.

Article VII.—Some New Salts of Uranium, by F. W. Clarke and Mary E. Owens.

Article VIII.—Graphite from Ducktown Tennessee, by W. L. Dudley and F. W. Clarke.

Article IX.—On the Distribution af Arsenic in the Human Body in a Case of Arsenical Poisoning, by S. W. Johnson and R. H. Chittenden.

A recent case of arsenical poisoning, in the State of Connecticut, led the proper authorities to demand a chemical examination of the body of the victim. Accordingly a large number of analyses of different parts of the body were made, and some facts of scientific interest with reference to the distribution of the arsenic were established. The arsenic was found in all the tissues and organs examined, though only an unweighable trace was detected in the brain.

Article X.—Synthesis of Salicylic Acid, by Edgar F. Smith.

When 1 part of copper benzoate is heated with about 3 parts of distilled water in a sealed tube at 180°, for three hours, a reaction takes place, which may be represented by the following equations:

$$2\ [(C_6H_5CO_2)_2\ Cu] + 2\ H_2O = Cu_2O + 3\ C_6H_5CO_2H + C_6H_4OH\ CO_2H.$$

Salicylic acid.

The yield of salicylic acid was not very abundant.

Recent Progress in Agricultural Science, by H. P. Armsby.

This is the first installment of a report on progress in the chemistry of agriculture. The chief subjects here taken up are the "*Effect of Temperature on the Vitality and Germination of Seeds,*" and the effect of the "*Presence of Oxygen.*"

Following this report there are Reviews. 1st of *Lunge's Treatise on the Manufacture of Sulphuric Acid and Alkali*, by J. W. Mallet; 2d. of *Beilstein's Handbuch der organischen Chemie;* 3d. of *Wurtz's Atomic Theory;* and 4th. of *Some Recent Investigations in Physical Chemistry*, particularly Julius Thomsen's *Thermochemical Investigations of the Theory of Carbon Compounds*, and J. W. Brühl's *Investigations on the Relations between the Refractive Powers of Bodies and their Chemical Constitution.* The last three reviews are by the editor.

The number closes with notes on: *The Opium Alkaloids*, by E. v. Gerichten; *River Water*, by C. M. Tidy and E. Frankland; *Two Remarkable Cases of Metamerism*, by L. Schreiner; *The Atomic Weight of Glucinum*, by Lothar Meyer; *The Nature of Caucasian Petroleum*, by F. Beilstein and A. Kurbatow.

PROCEEDINGS OF UNIVERSITY SOCIETIES.

Abstract of the More Important Papers Read at Recent Meetings.

Scientific Association.

A review of a recent paper by Julius Thomsen, of Copenhagen, entitled: "Thermochemical Investigations on the Theory of Carbon Compounds, by Ira Remsen.

In the paper it is shown that, by simple mathematical processes, starting from the figures representing the heat of combustion of some of the simpler hydrocarbons and the two oxides of carbon, a general formula can be deduced for the heat of formation of any hydrocarbon. By an application of this formula the structure of certain hydrocarbons can be determined, if the heat of combustion is known. As the determination of the heat of combustion is easily within the range of experimental possibilities, we have thus a new method, independent of the usual chemical transformations, for determining the structure of compounds. In the review sufficient of the details of the original paper were given to furnish an idea of the methods of reasoning and calculation adopted by Thomsen. A detailed review of the same paper is given in the "American Chemical Journal," vol. II., No. 5. (November, 1880.)

The Development of Phoronis: A Contribution to the Study of Animal Metamorphosis, by E. B. Wilson.

This communication gave an account of a paper by the author, read before the American Association for the Advancement of Science, at Boston, an abstract of which will appear in the "American Naturalist." An attempt was made to explain the steps by which the remarkable metamorphosis of *Phoronis* may have arisen.

Starting from a common point, the larva and adult have developed in two very different directions, by becoming adapted to entirely different conditions of life. The peculiar metamorphosis enables the creature to pass directly from one condition to the other, without losing time and energy in a stage of transition.

The peculiar disposition of the alimentary canal in *Phoronis* may be explained as the result of the flexure of a primitive form, whereby the anus was brought beside the mouth. The external flexure disappearing by fusion of the two parts thus brought into proximity, the animal attained its present structure.

Researches in Hydrodynamics, by H. A. Rowland.

The paper gave some of the results of an original investigation in Hydrodynamics, the fuller statement of which is about to appear in the American Journal of Mathematics.

On the Rotation of the Plane of Polarisation of Light by Reflection from the Surface of Strongly Magnetized Nickel, by E. H. Hall.

Three specimens of this metal have been experimented upon, all producing a decided effect of the same sign as that observed with iron.

On the Rate of Increase of the Speed of Trotting Horses as deduced from Statistics by the Graphical Method, by C. S. Hastings.

Philological Association.

Recent attempts to explain the forms attributed to the verb which appears in our Lexicons as φρέω, by C. D. Morris.

To Nauck's hypothesis of a verb arising by contraction from πρό ἵημι. Brugman objects (1) that no primitive *verb* can be cited as treated in this way, which is the more necessary, considering the laxity of the connection of prepositions in general with verbs, and (2) that Nauck is forced to reject or alter in an arbitrary way several of the forms which have to be accounted for. Curtius assumes that the root is φρη—from *bher*, φερ—(as βλητός is related to βέλος, etc). Brugman shows that though several of the forms in question may be accounted for by this assumption, still some of Curtius' analogies will not bear a close scrutiny, and that consequently his theory fails to account for several of the traditional forms. Brugman's own view is that Curtius' root *bher*, φρη—may be accepted as most easily explaining most of the forms; and that as there was a strong resemblance between some of these forms and those of ἵημι, as well as a close similarity in meaning, the two verbs became associated in the popular mind; and that thus the forms which are not referable to φρη—were made on the pattern of forms of ἵημι, though there is no etymological connection between the two verbs.

A note on Sievers' 'surd media' and Paul's 'sonant tenuis,' by H. C. G. Brandt.

It was claimed that such sounds do not and cannot really exist. They are due first to an inaccurate use of terms, and secondly to the failure of South or High Germans to appreciate the surdness and sonancy of certain consonants. Substitute for 'media' and 'tenuis,' 'fortis' and 'lenis' the proper terms 'sonant' and 'surd stops' and the impossibility and absurdity of 'surd' sonant stops and 'sonant' surd stops are apparent.

The surdness of all South German stops must be maintained.

It is only the result of the general High German tendency to turn every sonant into the surd stop. This tendency appears in the pronunciation of b, d, g in *lieb, bad, ging*; in Grimm's Law, Formula I.—Parent-Speech x > General Teutonic y > High German, z and in Formula III with Verner's Law P. S. z > G. T. x > H. G. y > H. G. z. The South Germans alone pronounce b, d, g initially as all Germans pronounce them finally i. e., they turn them into surd stops.

On some Inaccuracies in Du Cange's Glossarium mediae et infimae Latinitatis, by A. S. Cook.

The words of Anglo-Saxon origin in Du Cange were subjected to examination, and it was shown: (*a*) That the spelling of words in the Index appended to the last volume is often no guide to their actual forms in the Glossary proper. (*b*) That a large number of words defined and illustrated in the Glossary, many of them of peculiar importance, have never been entered in the Index. (*c*) That, of the words actually defined, the distortions in spelling are numerous. (*d*) That in certain cases passages do not exist in the places to which reference is made, while in others no proof citations are furnished. (*e*) That wrong etymons are frequent, though many of them should have been eliminated by the reviser. (*f*) That an oblique case, often the dative, of an Anglo-Saxon noun, is entered and treated as a nominative.

The Negative Particle Mie in Villehardouin and La Chanson de Roland, by B. F. O'Connor.

Mie is employed about forty times in the Chanson de Roland (XI Century), and nearly one hundred and thirty times in the Conquête de Constantinople (XIII Century). Its grammatical construction is also slightly different and shows that in the XI Century the original signification of *mie* (viz., a very small particle) was generally respected, whereas in the XIII Century it had almost entirely disappeared.

On certain important differences between Sixteenth and Nineteenth Century French, by A. M. Elliott.

The general tendency of XVI Century French is to elliptical turns and the omission of subject personal pronouns in subordinate or in the second of coordinate propositions, The principle of phrase-shortening is illustrated by the use of interrogative pronouns in indirect narration: direct subjunctive constructions without *que* are the rule. Time is saved by certain striking infinitive constructions after *verba dicendi et sentiendi* (*Il estimait être*, etc.). A singular species of attraction is seen in the abnormal phrase, *ce sont les Américains=C'est les Américains*, of XVI Century. Grammatical conceptions differed from ours, but had their *raison d'être* in the traditions of the old language. Illustrations from folk-speech—*j'ai tombé mon chapeau.* Mobility of syntax-elements is a chief characteristic.

A New Interpretation of ἄσπλαγχνος *in Sophocles, Aiax, 472*, by C. D. Morris.

The interpretation of Soph. Aj. 472 was discussed; and it was shown that the common rendering of ἄσπλαγχνος as cowardly could not be justified by the analogy of ἀκήριος because there was no evidence (with one possible exception) that the simple word σπλάγχνον (σπλάγχνα) was ever employed in the sense of *courage* or for the seat of *combative* emotions. From the use of the word in post-classical times it would rather seem that the tendency of the Greek mind was to associate it with the feelings of tenderness and sympathy. It was suggested, therefore, that the meaning of ἄσπλαγχνος in this line is rather to be derived from the sense the simple word bears in Soph. Ant. 1066 (τῶν σῶν ἐκ σπλάγχνων ἕνα). The wish of Ajax will then be that he may be able to prove to his father that he is in very truth his son. It was mentioned also that this meaning is now given to the word by Wecklein, who translates it, *degener illius natus*.

On the Guttural Nasal as Consonant and Vowel and its Representation in Sanscrit and Greek, by Louis Bevier, Jr.

In most alphabets the guttural nasal, even as a consonant, has no appropriate sign, and as a vowel is always represented by a digraph. Its existence as a vowel in Greek and Sanscrit rests on exactly the same proofs as that of the dental and labial nasal vowels. The guttural nasal is a true Indo-European semi-consonant, and fails to show the fluctuation between vocal and consonantal condition only because it does not stand at the end of any Indo-European root. The tables of semi-consonants given in Mr. Bloomfield's article on "The Greek Ablaut," in the last number of the American Journal of Philology should be completed by this addition.

Historical and Political Science Association.

The Irish Land Question, by H. C. ADAMS.

It was the object of this paper to present the Irish Land Question as it appears at the present day. For that purpose the form of land tenure previous to the Gladstone Land Act of 1870 was considered, as well as the economic conditions which that form of tenure had entailed upon Ireland. The conditions of the Act itself, its workings during the past ten years, and the prospect which it has secured for Ireland were also considered. A study of the question leads to the conclusion that the Gladstone Land Act, while correct in principle, is defective because it is incomplete. It is but the first step in a reform which Ireland needs.

A Review of a Recent Work by Henry Mann on "Ancient and Mediæval Republics," by M. I. SWIFT.

Mr. Mann was criticised for having attempted no comparisons.

Adopting the comparative method, it was shown that the Italians had developed with much less freedom than the Greeks; but were, like them, a new people. The working out of popular freedom was the great characteristic of both. In this, each Greek and Italian city passed through the same phases. The Persian War may be compared with that waged by Frederic Barbarossa; and the War of the Peloponnesus with the later struggles between Guelph and Ghibelline. The intense political life in both countries was the main cause of their great intellectual activity. The small size of each republic, the limited citizenship, commercial activity and the turbulent spirit of the people were causes of this intense life; limited citizenship and the system of mercenary soldiery hastened the downfall of the Republics.

The Greeks differed from the Italians in their greater regard for precedent. They also colonized, and cultivated oratory. Religion had opposite effects upon each. Individual cities were alike; Florence resembled Athens, and Venice, Sparta. Finally, Italian commonwealths did for the modern world what Greece had done for the ancient. They gave new birth to thought and freedom.

On the Social Tendency of Public Debts, by H. C. ADAMS.

A consideration of this subject falls under two heads: First, that of foreign debts or indebtedness from the one government to the citizens of another government; second, domestic debts or indebtedness from a government to its own citizens. In the first case public debts have a tendency to render the citizens of the debtor nation dependent upon the will of the citizens of the creditor nation, since, according to the practice of International Law, the proceeds of taxes must first go to satisfy the foreign obligations. This may be defended or deprecated according to the condition of the countries.

In the second case public debts do not have any tendency to produce class dependence, but to render permanent whatever class relations already exist. A centralization of capital is necessary before public debts can be contracted, but this is the result of the rules of distribution adopted by the country, and not of the employment of the borrowing system. Their social tendency is of but slight importance in the study of public debts.

The Pilgrim Fathers as Colonists, by H. B. ADAMS.

Without denying that religious liberty, in church form, was a prime consideration with the Pilgrims, it was attempted to show that secular motives entered largely into the determination to emigrate from Holland, where the Pilgrims already enjoyed perfect toleration. "The hardness of the place and country they were living in" (to use one of their own phrases); the desire to find a land where they could not only have liberty, but "live comfortably," the longing to "keep their names and nation," to retain the language and legal status of Englishmen, to enjoy the sovereign "protection" of England, whose grudging patronage they preferred to Dutch offers of free transportation and colonial outfit; the ambition "to enlarge the domains" of the English State, as well as of the Church of Christ, the intention to found a civil commonwealth (as their "intended course of civil community," spoken of by John Robinson, clearly proves); in short, the aim, common to all colonists since the world began, of bettering their actual condition, had no inconsiderable influence with the Pilgrim Fathers.

The reverence of the Plymouth colony for English law and civil government was also discussed. It was shown that the Pilgrims' compact was based upon English ideas of contract and civil polity; that Plymouth "courts of justice and magistrates" were "essentially civil;" that jury trial "according to the precedents of England," was one of the first acts of Plymouth legislation; that Plymouth lawgivers followed English precedents in the matter of legal penalties, laws of inheritance, conveyancing, land tenure, taxation, church rates, parish institutions, and local self-government in Church and State, and that church membership was not necessary for suffrage, as the case of Miles Standish proves.

English and Colonial Witchcraft Laws, by E. M. HARTWELL.

The aim of this paper was to show the operation of English law and thought in the witch trials of certain American colonies, as well as in the more familiar case of Salem. The course of English legislation respecting witchcraft was treated from the time of Cnut to that of James I. During the seventeenth century there was a wide-spread and genuine belief in witchcraft amongst all classes from the sovereign to the rabble. The witchcraft act of James I., which remained on the statute books from 1604 to 1736, was enforced or held to be in force in Nova Scotia, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, Maryland, Virginia, and South Carolina.

Recent Changes in Japan, by KAKICHI MITSUKURI.

The object of this paper was to show the causes, extent, and significance of the vast changes, both political and social, which have occurred in Japan. The constitution of the government and the state of society, forty years ago, were briefly described. The Emperor or Mikado was then, and had been for eight hundred years, the nominal head of Japan, but the actual power was in the hands of the Tokugawas, who was only a vassal and had usurped the control of the country. Below the Tokugawas was a class of feudal lords, known as Daimios, some of whom were rich and powerful. Both the Tokugawas and the Daimios depended for their strength upon the Samurai, or soldier-class, the most intelligent body of men in the country and distinguished for their virtues, traditions, and code of honor. Below the Samurai was the great mass of people. The tranquil state of society, the universal contentment engendered by a long peace of two hundred and fifty years, was disturbed by two revolutionary elements: (1) the study of history, which developed loyalism to the Mikado, who had been unjustly deprived of his rights; (2) the ambition of certain Daimios, originally the equals of the Tokugawas, to overthrow the usurper.

The occasion of the revolution was the advent of foreign nations, demanding treaties of peace and commerce. The Mikado refused the Tokugawas permission to open the country, and yet outside pressure was so strong that the latter ruler was forced to conclude treaties with America, England, France, Holland, and Russia. This was the signal for revolution, and for the restoration of the Mikado, which was finally effected in 1868. This restoration made all subsequent reforms possible. The spirit of change which has swept over the country was illustrated by incidents in the writer's own experience.

The two main questions now before Japan are (1) the creation of a national assembly, (2) the revision of treaties with foreign powers. The unsatisfactory condition of the foreign relations of Japan was discussed at length. The insults and abuses which Japan has had to suffer at the hands of the western powers, especially of England, are keenly felt by every Japanese. Western countries do not realize how unjustly and brutally their representatives in Japan are behaving. For example, foreign ministers, with the exception of the American, insist that the quarantine regulations, made by Japan, interfere with the trade of their nations, and therefore must not be enforced. In 1879 the German minister, at the instigation of the minister of England, sent a gunboat to take out a German merchantman, which had come from a port with a cholera epidemic, from the quarantine station, near Yokohama, and landed the passengers and goods under the protection of the guns from the war-vessel.

The Coat of Arms of Maryland, by W. H. BROWNE.

After adverting to the fact that during the recent celebration about nine wrong coats were displayed to every right, which seemed to indicate a general want of information upon the subject, and exhibiting a copy of the correct coat, as described in the letter of Cæcilius Calvert, (quoted in Bozman's History of Maryland), he explained the historical, political, and heraldic significance of the device, and showed why it was that, while other colonies marked their assumption of independence and emphasized their breach with the past by the adoption of new symbols, Marylanders had neither desire nor reason to abandon a cognizance that had always been to them the emblem of the rights and liberties which they took up arms to defend.

On Newspapers as Sources of History, by H. B. ADAMS.

The extent and value of the files of Baltimore newspapers preserved in the library of the Maryland Historical Society were represented, and measures were urged for the preservation of files of contemporary newspapers from the Mercantile Library. A full list of these is in preparation for publication.

On Machiavelli, by EDGAR GOODMAN.

On Systems of Rent from the Comparative Standpoint, but with particular reference to the Baltimore System of Ground Rents, by T. J. LEFTWICH.

A Review of a Work on Progress and Poverty, by Henry George (San Francisco, 1879), by H. C. ADAMS.

Note on the History of Geography, by E. M. HARTWELL.

On the Status of the Negro in the South, by W. J. THOMAS.

On Karl Marx and the International, by D. L. BRINTON.

A Review of Short's North Americans of Antiquity, by E. W. BEMIS.

The Disturbances in Barbadoes in 1876, by J. F. JAMESON.

Metaphysical Club.

The Logic of the Epicureans, by Allan Marquand.

This paper considered (1) the logic of Epicurus and (2) its development by Zeno, of Sidon, 200 years later.

(1.) In treating the views of Epicurus notice was taken of his teaching that words are signs of things (not of our ideas of things), that knowledge springs from sensation, that sensation and feeling are tests of truth. It was pointed out that he laid the basis for a philosophy of discovery by asserting as a fundamental principle that phenomena are signs of the unknown, and by his having distinguished two modes of investigation (the *μοναχός* and the *πλεοναχὸς τρόπος*). Contrast this with the rhetorical analysis of the Stoics.

(2.) Zeno, of Sidon, starting from the foundations of Epicurus, constructed a logic which paid special attention to the problem of induction. The method of resemblance which he describes is better than mere induction *per enumerationem simplicem*. It implies the observation of "varied" as well as "many" instances of a phenomenon. In the hands of Zeno, Epicurean logic becomes emancipated from its bondage to Physics. Logical principles and methods are investigated, and logical rules receive a formal statement. The logic, moreover, has grown less dogmatic, and thus stands in close relation to Skepticism.

On Purpose in Thought, by Josiah Royce.

There are three possible ways of studying human thought. The first is the way of psychological analysis; the second of logical analysis. A third is that of the analysis of thought considered as an activity having some definite purpose. This may be called the teleological analysis of thought, and this method of thought-study formed the special subject of the essay.

Asking, then, "what is the purpose of purely theoretical thought?" the essayist first considered the attempted answer, that "the end of thought is correspondence with a reality external to thought" This answer was found inadequate, since thought can only grasp its own content. The next answer, that "the end of thought is the attainment of a confidence that it is in agreement with a reality external to itself," was found not to cover the case, in which thought aims to apply to experience certain axioms that only make assertions as to regularities of sequence in experience, not as to anything existing external to experience. As a better answer, the essayist then began the examination of the following statement of the ends of thought: "Thought purposes to get the mastery over experience, so as to be able to predict future experience, and to know in general the laws of sequence in experience." As a particular case of the purpose of thought thus defined, the essayist took that of the axiom of uniformity. The effort to find in the axiom of uniformity an expression of the unity and necessary continuity of self-consciousness was first examined. This view was rejected as insufficient, because it does not show why or how we conceive of experience as following exact and fixed law, not as merely containing some indefinite sort of general uniformity. Next in order came the theory lately stated in full by Mr. Shadworth Hodgson, the theory that reduces the axiom of uniformity to a mere consequence of the axiom of identity. This doctrine was set aside as not adequate to the real claims of the axiom of uniformity. There remained apparently only the skeptical conclusion that the purpose of thought cannot be adequately expressed without exceeding the limits set by the data of consciousness. In short, as thought aims at anticipating experience, and yet does not create experience, there would seem to be an eternal conflict between the end and the means of realizing it. Experience as past and as future really is in one sense the construction of thought itself, which, dealing always solely with the present, constructs for itself the conception of past and future by its own activity, and hence is able to make certain formal assertions about the nature of these, its own constructions. From this point of view past and future experience appear as projections outward of certain data of present consciousness, so that these data appear to have a validity beyond the present moment in which they are immediately given. The axiom of uniformity expresses a necessary part of the conception of experience as a whole formed in and by this conception, and so has a necessary validity. These considerations led to the final statement of one great purpose of thought. "The end of thought in assuming the axiom of uniformity is the construction of an ideal picture of a world of experience that shall be seen as one."

An Account of a Machine, which he had Invented, for Producing Syllogistic Variations, by Allan Marquand.

The machine presents to view three flaps containing the two premises and conclusion of a syllogism, as in the diagram.

(1)

$\boxed{A \prec B}$

(2)

$\boxed{B \prec C}$

(3)

$\boxed{A \prec C}$

Each flap on making a half revolution presents a contraposed form of its proposition. By a simple mechanism of friction wheels flap No. (1) makes its half-revolution at the end of every turn of the crank. Flap No. (2) makes its half-revolution at the end of every alternate turn. Flap No. (3) at the end of every fourth turn.

Thus from Barbara, contraposing by negation, we have the following variations.

$\bar{B} \prec \bar{A}$	$A \prec B$	$\bar{B} \prec \bar{A}$	$A \prec B$	$\bar{B} \prec \bar{A}$	$A \prec B$	$\bar{B} \prec \bar{A}$
$B \prec C$	$\bar{C} \prec \bar{B}$	$\bar{B} \prec \bar{C}$	$B \prec C$	$B \prec C$	$\bar{C} \prec \bar{B}$	$\bar{B} \prec \bar{C}$
$\therefore A \prec C$	$\therefore A \prec C$	$\therefore A \prec C$	$\therefore \bar{C} \prec \bar{A}$	$\therefore \bar{C} \prec \bar{A}$	$\therefore \bar{C} \prec \bar{A}$	$\therefore \bar{C} \prec \bar{A}$

By various modifications of Barbara and by adopting other modes of contraposition an indefinite number of similar variations may be secured.

On a Method of Arriving at, and a New Notation for, DeMorgan's Twenty Propositions, by O. H. Mitchell.

Let. A = all of A, a = part of A, $\bar{A}$ = all of *non*-A, and $\bar{a}$ = part of *non*-A. Qualifying a second term, B, in the same way, and affirming and denying the identity of each modification of the first term with each of the second, we get thirty-two propositions, of which, however, twelve are mere repetitions. The twenty distinct ones are the same as De Morgan's Twenty Propositions. Those in which both terms are small letters are his Eight Simple Propositions.

If we write these eight propositions with negative unity affixed as an exponent in the place of each dash, all syllogism, excluding combinations of particulars, becomes mere algebraic multiplications of premises, with the convention that the conclusion is zero unless the middle term disappears from the product. Thus, $(a^{-'}m)^{-'} \times b^{-'}m = a\, b^{-'}$, but $(a^{-'}m)^{-'} \times b\, m^{-'} = 0$, &c.

Richard Wagner's Theory of Music as an Art, read for the author by W. S. Pratt.

Wagner's musical philosophy rests upon the doctrine of philosophy that in general the external, phenomenal world is known to us only in terms of the internal, real world of consciousness, and that the two are thereby recognized to have the same essential nature. The aim of Art is to represent this inner essence. Since, then, mind and matter must be conceived as existing in time and space respectively; since music accomplishes its representative task through the immaterial medium of time alone, and since audition (as compared with vision) tends to obliterate the distinction between the Ego and non-Ego, music is the greatest and most deeply expressive of the Fine Arts. In practice, however, she should satisfy intellectual cravings by associating together all the arts into a unified drama, having for its subject the Myth as giving the truest picture of humanity. This is the "Kunstwerk der Zukunft," and is curiously analogous to the unificatory tendencies in contemporary science.

In conclusion, the unquestionable success of Wagner was described in realizing his theories in "The Nibelungen Trilogy," and more especially in "Tristan and Isolde."

A Report on Wundt's Logik (Bd. I. Erkenntnisslehre), by G. S. Morris.

Attention was called to those passages (among others) in which the author, eminent as a physiological and psycho-physical investigator, reinforces the old position, that no conscious mental act is finally accomplished through merely psycho-physical processes in general, or through processes of association in particular. In addition to these there must be an "apperceptive synthesis," or act of intellectual recognition, which is essentially volitional, and proceeds from the "thinking self,"—the latter being directly and fully known in self-consciousness as the veritable noumenon or "thing-in-itself," and not simply as an impenetrable phenomenon. Psychological laws are, therefore, not logical laws. Psychology is a natural science, logic (along with ethics and aesthetics) a mental science. The analogy for a final interpretation of all existence is to be sought in mind rather than in "nature."

A Problem in Mental Physiology, by W. T. Sedgwick.

An opinion, held by eminent physicians, leads to the conclusion that emotions, or emotional methods of thought, are much more exacting of cerebral tissue than any other functions of the brain.

The author of this paper believes that this is chiefly owing to two things: First, because the process involved is much more complex than usual, and, second, because very many emotions have no reflex ancestry; while, being the offspring of civilized life, inheritance and long use have not yet reduced them to a condition so reflex that they may be produced economically.

An Account of Francis Galton's Psychological Inquiries, by Allan Marquand.

These embraced (1) Psychometric Experiments with associated ideas, an introspective mode of research to ascertain the properties of such ideas and the time required for their production: (2) Statistics of Mental Imagery, involving a comparison of introspective inquiries concerning the qualities of visualized objects and numerals: (3) Composite Portraits, an objective mode of abstracting the general characteristics of a number of objects.

The results obtained by Mr. Galton were considered as establishing a valuable mode of psychological inquiry.

Operations in Statistical Number, by B. I. Gilman.

In this paper, Relative Number was defined to be the average number per y of relations of the form x, which have relates or correlates among the y's. It was shown that Relative Number, in which the relations concerned are relations of identity, is what is known as Probability. From formulae which were established at length for the addition, subtraction, multiplication and involution of Relative Number, a number of Theorems in Probabilities were deduced.

A Study of a Portion of Hume's "Human Understanding," by B. C. Burt.

Leslie Stephen on Causation, by G. S. Morris.

Hegelianism in St. Louis, read for the author by C. W. Nichols.

Mathematical Seminary.

May Meeting.

A Problem in Maxima and Minima, by R. W. Prentiss.

In determining the angle of minimum deviation of a ray of light through a prism, we can avoid the usual process of forming the differential coefficient, equating it to zero and solving the resulting equation, if we can show that within the conditions of the problem there is but one minimum.

By a simple experiment (Ganot's Physics, pg. 446), it is shown that there is but one deviation less than any other. By the usual notation

$$d = i + r' - i' - r \qquad i' + r = A \quad \therefore \quad d = i + r' - A.$$

The equations expressing relations between i and r' are by principles of refraction, n being index of refraction:

$$\begin{array}{ccc} \sin r' = n \sin i' & & \sin i = n \sin r \\ i' = A - r & \text{or} & r = A - i' \\ n \sin r = \sin i & & n \sin i' = \sin r'. \end{array}$$

From the symmetry of these relations it is evident that d can be expressed as precisely the same function of r' as of i *i. e.* d = f (r') or d = f (i) where f denotes a definite function. Whatever value of i, then makes d = f (i) a minimum must be a value of r' that makes d = f (r') a minimum, and since, as shown above, there is only one minimum, we must have, at that minimum, i = r' the usual result.

A Geometric Locus, by R. W. Prentiss.

The locus of the vertex of a tetrahedron, each of whose faces passes through a fixed point, and whose base edges move in fixed planes, is in general, a surface of the third order having the intersection of the three fixed planes for a double point. If, however, the four fixed points lie in one plane, the surface breaks up into a plane and a cone of the second degree.

Denote the fixed points P′, P″, P‴, P⁗, by their coördinates $(\alpha', \beta', \gamma', \delta')$, $(\alpha'', \beta'', \gamma'', \delta'')$, &c., &c. Let the fixed places be given by $\alpha = o$, $\beta = o$, $\gamma = o$.

The plane of the base may then be put into the form, $L\alpha + M\beta + N\gamma + P\delta$ where L, M, N, P are indeterminates, subject to condition $L\alpha'''' + M\beta'''' + N\gamma'''' + P\delta'''' = o$. The equations of the planes of the three faces which meet at the vertex are found to be

$$\begin{array}{rlllll} & (\alpha\alpha') & L + (\alpha\beta') & M + (\alpha\gamma') & N + (\alpha\delta') & P = o \\ & (\beta\alpha'') & L + (\beta\beta'') & M + (\beta\gamma'') & N + (\beta\delta'') & P = o \\ \text{and} & (\gamma\alpha''') & L + (\gamma\beta''') & M + (\gamma\gamma''') & N + (\gamma\delta''') & P = o \\ \text{the above condition is} & \alpha'''' & L + \beta'''' & M + \gamma'''' & N + \delta'''' & P = o \end{array}$$

where we denote by $(\alpha\beta')$, &c., the expressions $\alpha\beta' - \alpha'\beta$, &c.

Eliminating L, M, N and P from these equations, we obtain the equation of the locus. The result of elimination is a compound determinant of the fourth order, evidently reducing to a simple one of the fifth order, thus :—

$$\begin{vmatrix} (\alpha\alpha'), & (\alpha\beta'), & (\alpha\gamma'), & (\alpha\delta') \\ (\beta\alpha''), & (\beta\beta''), & (\beta\gamma''), & (\beta\delta'') \\ (\gamma\alpha'''), & (\gamma\beta'''), & (\gamma\gamma'''), & (\gamma\delta''') \\ \alpha'''', & \beta'''', & \gamma'''', & \delta'''' \end{vmatrix} = \begin{vmatrix} \alpha, & \beta, & \gamma, & \delta, & 1 \\ \alpha\alpha', & \alpha\beta', & \alpha\gamma', & \alpha\delta', & \alpha' \\ \beta\alpha'', & \beta\beta'', & \beta\gamma'', & \beta\delta'', & \beta'' \\ \gamma\alpha''', & \beta\gamma''', & \gamma\gamma''', & \gamma\delta''', & \gamma''' \\ \alpha'''', & \beta'''', & \gamma'''', & \delta'''', & 0 \end{vmatrix}$$

$= \alpha\beta\gamma\,(\alpha'\beta''\gamma'''\delta'''') - \alpha'\beta\gamma\,(\alpha\beta''\gamma'''\delta'''') + \beta''\gamma\alpha\,(\alpha\beta''\gamma'''\delta'''') - \gamma'''\alpha\beta\,(\alpha\beta'\gamma''\delta'''') = 0$, developing according to last column and denoting by $(\alpha'\beta''\gamma'''\delta'''')$, &c., &c.; the determinants of coördinates of P′, P″, P‴, P⁗; &c., respectively. Substituting for α, β and γ, $\rho\lambda$, $\rho\mu$ and $\rho\nu$ respectively, the equation assumes the form $A\rho^2 + B\rho^3 = 0$, showing that the intersection of α, β, γ is a double point of the surface. The surface passes through the four fixed points and contains the lines $[\alpha, \beta]$, $[\alpha, \gamma]$, $[\alpha, (\alpha\beta''\gamma'''\delta'''')]$, also $[\beta, \gamma]$, $[\beta, \alpha\beta'\gamma'''\delta'''')]$, and $[\gamma, (\alpha\beta'\gamma''\delta'''')]$ where $[\alpha, \beta]$, &c., denote lines of intersection of $\alpha = o$ and $\beta = o$, &c., respectively.

If the four points lie in one plane, $(\alpha'\beta''\gamma'''\delta'''') = o$.

The expressions $(\alpha\beta''\gamma'''\delta'''')$, $(\alpha\beta'\gamma'''\delta'''')$ and $(\alpha\beta'\gamma''\delta'''')$ which, equated to zero, are the equations of planes passing through three of the points, viz.: P″, P‴, P⁗; P′, P‴, P⁗; P′, P″, P⁗ respectively, are now the equation of the plane of the four points, and must therefore be multiples of the same linear function of $\alpha, \beta, \gamma, \delta$, say $l\triangle$, $m\triangle$ and $n\triangle$ respectively. The equation of the locus then becomes

$$\triangle(-l\alpha'\beta\gamma + m\beta''\gamma\alpha - n\gamma'''\alpha\beta) = O$$

$$\triangle = O \text{ (a plane)} \quad \text{or} \quad -l\alpha'\beta\gamma + m\beta''\gamma\alpha - n\gamma'''\alpha\beta = O \text{ which gives a cone.}$$

October Meeting.

A Deduction from the Properties of a System of Three Circles, by F. Franklin.

The properties of a system of 3 circles and their orthogonal circle give, by projection, the following theorem: If 3 conics pass through 2 fixed points P, Q, the 3 junctions of the other two intersections of each pair of the conics meet in a point R; the 6 contacts of tangents from R to the 3 conics lie on a conic passing through P, Q; and the tangent to this conic at its intersection with any one of the 3 original conics cuts the line $P\,Q$ in the harmonic conjugate with respect to P and Q of the point in which the tangent to the original conic at the intersection in question cuts $P\,Q$.—As a limiting case of this, let P and Q coincide; then the harmonic conjugate above-mentioned will coincide with them; hence the conic through the 6 points of contact has for its tangent at each of those points a line passing through P, itself a point of the conic; the conic must therefore be a pair of straight lines intersecting in P. Hence we have the theorem:

If 3 conics touch at a point P, the 3 chords of intersection of the conics taken in pairs meet in a point R, and the 6 contacts of tangents from R to the 3 conics lie by threes on 2 straight lines intersecting in P.

The theorem above demonstrated is virtually equivalent to a well-known theorem.

On the Properties of the Roots of $x^2 \equiv x$ mod. k, by O. H. Mitchell.

Let $k = a^t\, b^u \cdot\cdot\, q^z$, the number of unequal prime factors, $a, b, \cdot\cdot\, q$ being i. Then among the 2^i roots of the congruence $x^2 \equiv x$ mod. k there will be one which is prime to k, one containing a and *not* $b \cdot\cdot\cdot q$, one containing only b, one containing only $a\,b$, &c., &c. These roots may therefore be rep-represented by

R_1, Ra, Rb, Rc, -- Rab, Rbc, -- $Rabc$, ---, the subscript denoting what unequal prime factors the root has in common with k. Thus if $k = 60$, $R_1 = 1$, $R_2 = 16$, $R_3 = 21$, $R_5 = 25$, $R_{2,3} = 36$, $R_{3,5} = 15$, $R_{5,2} = 40$, $R_{2,3,5} = 0$.

If s, s', s'', &c. are any combinations of the unequal prime factors of k, prime to one another, the following relations hold:

(1) $Rs\,Rs' \equiv Rs\,s'$ mod. k; thus $R_3\,R_5 \equiv R_{3,5}$ mod. 60.

(2) $Rs + Rs' \equiv Rs\,s' + 1$ mod. k; thus $R_3 + R_5 \equiv R_{3,5} + 1$ mod. 60.

(3) $\Sigma_0^n\, Rs \equiv Rss's'' \cdot\cdot\, s^{[n]}$ mod. k; or, more generally still,

(4) $$\Sigma\, Rss' \cdot\cdot\, s^{[r]} \equiv \frac{\pi n}{\pi\,(n-r)\,\pi r}\, Rss's'' \cdot\cdot\, s^{[n]} + \frac{\pi n}{\pi\,(n-r+1)\,\pi\,(r+1)}$$

$\therefore$ (5) $\Sigma^{2i}\, R \equiv 2^{i-1}$.

(6) $Rss''s''' - Rs's''s''' \equiv Rs'' - Rs's'' \equiv Rs - Rs'$. If we have $s\,s' \cdot s^{[n]} = w =$ the product of all the unequal prime factors of k, then (7) $Rss's \cdot\cdot\, s^{[n]} \equiv 0$ mod. k.

$\therefore$ (8) $(Rs - Rs')^2 \equiv 1$, when $ss' = w$.

On v. Gall's Table of Groundforms for the Octavic, by F. Franklin.

In Sylvester's table of the groundforms of the Binary Octavic (American Journal of Math., Vol. II., p 233), there are given 3 forms of degorder (7.6), 3 of degorder (9.2) and 2 of degorder (11.2). Proceeding by the method of Clebsch and Gordan, v. Gall finds one less in each of these degorders (see Mathem. Annalen, vol. xvii, p. 150). Mr. Franklin explained how the number of groundforms of a given degorder may be determined, and showed that the numbers given in Sylvester's table agree with those obtained by a direct consideration of the partitions involved, so that v. Gall's table conflicts with the fundamental theorem for the determination of the number of linearly independent covariants of a given degree and order.

P. S.—Since the meeting of the Seminary, Prof. Sylvester has received a letter from Mr. v. Gall, stating that he had discovered an oversight in his work, on correcting which the above disagreement is removed.

November Meeting.

Outline of Clebsch's and Gordan's Method of Finding the Groundforms of a Binary Quartic, by W. E. Story.

J. R. McD. IRBY, Ph. D.

Late Fellow in the Johns Hopkins University.

Professor G. vom Rath, the distinguished Mineralogist, of the University of Bonn, recently read before the *Niederrheinischen Gesellschaft für Natur und Heilkunde*, in Bonn, a tribute to the memory of the late Dr. Irby, the substance of which is given in the following paper, by W. D. Booker, M. D., of Baltimore:

Dr. Irby was born August 4th, 1854, at Lynchburg, Va. He graduated at the University of Virginia, and went in 1875 to Heidelberg; the following year he came to Bonn, where he devoted himself to crystallography and mineralogy. Here he solved most creditably a prize problem proposed by the Philosophical Faculty of the University, in an essay which he afterwards published under the title of "The Crystallography of Calcite." In recognition of this work the University of Göttingen bestowed upon him the degree of Doctor of Philosophy. Accompanied by his young wife, whom he married in Bonn, he returned to the United States in 1878, and was employed in Washington by the United States Coast Survey upon the exposition of crystallographic methods of projection, and by the Smithsonian Institution in editing some manuscript notices of Smithson, saved from the conflagration of the Institution in 1860.

Dr. Irby had scarcely finished this work when the death of his father and mother, on the same day, in New Orleans, of yellow fever, caused him to hasten to that city, where he remained to prevent the sacrifice of his father's business for the sake of his two younger brothers. In July 1879, he received an appointment to a fellowship in the Johns Hopkins University, and moved to Baltimore to reside. There he made extensive preparations and plans for his future work. While holding his office at the University, he hoped to be able to carry out, during a three months' vacation, an examination, with which he was charged by the United States Geological Survey, into the most important mineral districts of the United States, particularly those of Lake Superior. Thus he hoped gradually to get into possession of the materials which were to form the foundation for the work to which he wished to devote his life—a treatise on the minerals of the United States. He intended to begin with calc-spar, for the study of which he was specially prepared. Professors Brush, of New Haven, and Egleston, of New York, loaned him forty magnificent calc-spar specimens from Lake Superior, which can hardly be obtained by purchase.

The theory of the calc-spar system, the scrutiny of its zones and of the planes lying in them, appeared to him to be the real centre and essence of crystallography. For several months he was engaged in elaborating his lectures and noting measurements, with Fuess's Goniometer, of calc-spar and some organic compounds in which he had recognized interesting relations between form and composition. In February 1880, an enticing prospect of mineralogical labor was opened to him, A financial company in New York charged him with the examination of a district in Chili, that he might form an intelligent opinion as to the prospect of a mining enterprise there. With quick readiness he accepted the charge, hoping to be able thoroughly to investigate a little known, almost virgin, territory. He sailed March 2d from New York. His last letter, dated Panama, March 17th, was full of hope and bright expectations. On the forenoon of March 25th he seemed perfectly well; in the afternoon of the same day he was found lifeless in his cabin, having died without a struggle or sign of pain, probably of some obscure heart disease. He was interred at Pacasmayo, Peru.

Thus science was robbed of a disciple of great promise, of keen observation, and full of enthusiasm; his friends have lost a friend of rare kindness of heart and faithfulness, his family an excellent husband, father, and brother. Irby's dissertation "On the Crystallography of Calcite" must necessarily be employed as the foundation of all future investigations of this mineral, so rich in its forms. Dr. Irby, who was several times a guest of this society, leaves with all who knew him the impression of a man of unusual power, combining in himself qualities which are rarely found together in one person, searching acuteness being united with childlike kindness and purity of heart. His conversation, always the faithful expression of his thoughts, was without guile and without pretence.

Some of the friends of Dr. Irby, in Germany, are making a contribution towards a fund for the education of his infant son. A similar subscription will be begun in this country, and those who desire to be informed in respect to it are invited to communicate with Dr. W. D. Booker, 152 W. Madison Street, Baltimore.

Award of the Copley Medal.

The Royal Society has awarded to Professor Sylvester, of the Johns Hopkins University, Baltimore, the Copley medal, the highest distinction in their gift. I hear this was unanimously voted by the Council in recognition of the originality and variety of Professor Sylvester's mathematical work, and his valuable service in stimulating high mathematical study at Baltimore. The compliment was coupled privately with expressions of regret that Professor Sylvester's abilities have been transferred to America.—*From a London Telegram, by G. W. S., to the New York Tribune, Nov. 21, 1880.*

This medal was first given by the Society in 1753, to Dr. Benjamin Franklin. In the following list the names are recorded of those who have received this honor during the last twenty years:

1860.	R. W. Bunsen.	1870.	J. P. Joule.
1861.	L. Agassiz.	1871.	J. R. Mayer.
1862.	T. Graham.	1872.	F. Wöhler.
1863.	A. Sedgwick.	1873.	H. L. F. Helmholtz.
1864.	C. Darwin.	1874.	P. Pasteur
1865.	M. Chasles.	1875.	A. W. Hofman.
1866.	J. Plücker.	1876.	C. Bernard.
1867.	K. E. Von Baer.	1877.	J. D. Dana.
1868.	C. Wheatstone.	1878.	J. B. Boussingault.
1869.	V. Regnault.	1879.	R. J. E. Clausius.

The mathematical medallists in previous years have been: Waring (1784); Ivory (1814); Gauss (1838); Sturm (1841); Chasles (1865); Plücker (1866).

Graduates of 1880.

DOCTORS OF PHILOSOPHY.

Francis G. Allinson, *Burlington, N. J.*, A. B., Haverford, 1876, and A. B., Harvard, 1877.

Thesis, On Ionic Forms in the Second Century, A. D., and the obligation of Lucian to Herodotus.

Fabian Franklin, *Baltimore*, Ph. B., Columbian, 1869.

Thesis, On Bipunctual Co-ordinates.

Edwin H. Hall, *Gorham, Me.*, A. B., Bowdoin, 1875.

Thesis, On the New Action of Magnetism on a Permanent Electric Current.

Allan Marquand, *New York City*, A. B., Princeton, 1874.

Thesis, The Logic of the Epicureans, with a translation of a treatise of Philodemus.

Washington I. Stringham, *Topeka, Kansas*, A. B., Harvard, 1877.

Thesis, On Regular Figures in n dimensional Space. (5)

BACHELORS OF ARTS.

Thomas M. Beadenkopf,	*Baltimore.*
A. Kerr Bond,	*Harford County.*
William C. Day,	*Baltimore.*
Henry L. Gantt,	*Owings Mills.*
Edgar Goodman,	*Baltimore.*
Carl E. Grammer,	*Baltimore.*
Alexander F. Jamieson,	*Alexandria, Va.*
Edmund A. Jarvis,	*Baltimore.*
Stewart B. Linthicum,	*Baltimore.*
John H. Lowe,	*Baltimore.*
Leigh C. Morgan,	*Baltimore.*
Nelson Palmer,	*Baltimore.*
Thomas Pettigrew,	*Hillsboro', N. C.*
Harry F. Reid,	*Baltimore.*
W. Raymond Stricklen,	*Baltimore.*
Lewis W. Wilhelm,	*Baltimore.* (16)

Baltimore Naturalists' Field Club.

The Baltimore Naturalists' Field Club was founded on the eighth of last April, by members of the University, in order to endeavor to meet the recognized want in the city of some organization for the active promotion of field work in Natural History. Professor H. Newell Martin was elected President, and Mr. E. M. Hartwell, Secretary. The objects of the club are to study the Fauna, Flora, Geology and Physical Geography of the Baltimore district and make and preserve collections illustrative of the same.

At the first meeting of the club, it was voted to form sections on Botany, Aquatic Animals, Invertebrate Land Animals, Vertebrate Land Animals, and Geology and Physical Geography. The following gentlemen were chosen chairmen of the respective sections: Mr. W. T. Sedgwick; Dr. S. F. Clarke; Mr. W. B. James; Dr. W. A. Moale; and Mr. E. B. Wilson. Each chairman is empowered to select a committee of three, to specially act with him in carrying on the work of his section.

All members of the University, and residents of Baltimore of known attainments as naturalists are eligible for election to the club. The membership has nearly doubled since the society begun, with twenty-two original members; of those who have since joined about half are not connected with the University. Field meetings are held every fine Saturday during the warmer periods of the academic year. Monthly meetings, to consider the reports of chairmen of the various sections, and discuss the general results of preceding excursions, are also held. On the occasion of its first field meeting, on April 17, the club visited Clifton and Montebello. On subsequent occasions, excursions have been made to the Spring Gardens district; the region north of Woodberry; the Valley of Gwinn's Falls; the Marine Hospital neighborhood; that part of the Valley of the Patapsco between the Relay House and Ilchester; and to Pen-Mar.

At a special meeting, held in Hopkins Hall, May 24, Mr. P. R. Uhler, President of the Maryland Academy of Sciences, gave a general description of the features of the high tongue of land lying between the middle and southwest branches of the Patapsco. He said that the soil of this region was derived from decomposed drift, subsequently recomposed, and from the mud of an ancient swamp, which once contained numerous *Cycads* and reeds. He showed that the whole region had been formed during the Jurassic period by deposits of material transported from high mountains adjoining on the north. The present features of the region he held to be due to water action in Post-Jurassic time, in which the ocean seemed to have had no part.

Thus far the efforts of the club have been directed, mainly in its field meetings, to familiarizing its members with the general topographical features of the regions adjacent to Baltimore, and to ascertaining the best localities for collecting.

Next season it is proposed that each section work independently and in a more detailed method than has been possible hitherto. Every step thus far has emphasized the need of a topographical map of the suburban districts.

Teachers' Class in Latin.

A teachers' class for the study of the Elements of the Latin Language, conducted by PROFESSOR CHARLES D. MORRIS, was formed on Saturday, October 23, 1880, at 10 A. M., in Hopkins Hall, and is to meet on successive Saturdays, at the same place and hour, until twenty lessons have been given. Each session lasts about two hours.

The class is intended for those only who have no knowledge of the subject whatever, but are desirous of acquiring it with as small an expenditure of time and labor as may be.

As the system pursued may be novel to many who are engaged in the work of teaching Latin, Professor Morris is glad to welcome as auditors a small number of teachers interested in observing what can be effected by the method.

The next number (Vol. I., No. 4) of the AMERICAN JOURNAL OF PHILOLOGY will contain articles as follows:

On the Codex Neapolitanus of Propertius, by ROBINSON ELLIS.
Imperfect and Pluperfect Subjunctive in Roman Folk-speech, by E. A. FAY.
The Parodos of Aristophanes' Vespae, by F. G. ALLINSON.
Problems of Semitic Philology, by C. H. TOY.
The Agamemnon of Aeschylus, by LEWIS CAMPBELL.
Keltic and Germanic, by JAMES M. HART.

At a meeting of the British Association for the Advancement of Science, held October 8, 1880, the committee for the Calculation of Tables of the Fundamental Invariants of Algebraic Forms, consisting of Professors Sylvester, Cayley, and Salmon, were reappointed, and the sum of 40 l. was placed at their disposal.

Fellowships.

The following persons have been recently invited to become Fellows in the place of Messrs Nichols and Rowland resigned.

In Chemistry, Mr. ROBERT DORSEY COALE, of Baltimore, for the last four years a student in this University.

In Biology, A. F. W. SCHIMPER, Ph.D., of the University of Strassburg. Dr. Schimper has resigned a position which he held in the Museum of Natural History at Strassburg, Elsass, in order to come to Baltimore.

Fellows by Courtesy.

By a vote of the Academic Council, the following names will be enrolled on the list of Fellows by Courtesy, during the coming year.

LAWRENCE B. FLETCHER, A. B., late a Fellow of Columbia College.
ALLAN MARQUAND, Ph.D., late a Fellow in this University.
EDWARD L. NICHOLS, Ph.D., late a Fellow in this University.
HENRY A. SHORT, A. B., a Fellow of Columbia College.

Graduate Scholarships.

The Trustees of the Johns Hopkins University, last summer, agreed to offer during the coming academic year a number of graduate scholarships. Three of these were awarded, June 10, 1880, to the following members of the graduating class, in recognition of the ability they had shown as undergraduate students:

WILLIAM C. DAY, of Baltimore.
HENRY L. GANTT, of Baltimore.
HARRY F. REID, of Baltimore.

Mr. Gantt subsequently gave up the scholarship to accept the post of an instructor in the McDonogh School, Owings Mills, Md.

A fourth scholarship was awarded at the same time to a resident graduate. CHARLES H. KOYL, of Cobourg, Ontario, a graduate of Victoria University, Ontario.

Early in the present session two more of the scholarships were awarded, for high attainments, to the following graduates:

SAMUEL C. DERBY, of Antioch, Ohio, a graduate of Harvard College.
HENRY N. STOKES, of Moorestown, N.J., a graduate of Haverford College.

The principles which governed the award were nearly the same as those which have been observed in bestowing the fellowships.

The bestowal of the vacant scholarships will be considered by the Academic Council (consisting of the President and Professors) early in January next.

Brief Announcements.

FRANCIS G. ALLINSON, Ph.D., late Fellow in Greek, has been appointed Assistant Professor of Greek and Latin in Haverford College.

LYMAN B. HALL, Ph.D., late Assistant in the Chemical Laboratory here, has been appointed Professor of Chemistry and Physics, in Haverford College.

Mr. P. B. MARCOU, A.M., of Harvard College, has been appointed an instructor of the major and minor courses in French. Mr. Marcou was born in France and received in Paris his early education.

Mr. G. H. STOCKBRIDGE, A.M., of Bates College, Me., is giving instruction, during the current year, in Latin and German. He was previously an instructor in Amherst College.

In addition to the classes enumerated on previous pages of this Circular a class in Drawing, conducted by Mr. HUGH NEWELL, Instructor in Drawing in the Maryland Institute, has been formed and meets twice weekly in the rooms of the Biological Laboratory.

The FIFTH ANNUAL REPORT OF THE PRESIDENT of the University, for the year ending Sept. 1, 1880, was presented to the Trustees at their regular meeting in October, and is now in press,—nearly ready to be issued. It will contain a review of the work of the year, with the usual statistical appendix.

At a meeting of the Board of Trustees, held October 4, 1880, the President of the Board called the attention of the Trustees to a portrait of the Founder, recently painted by Mr. LeClear, of New York, and presented to the University, in June last, by Mr. John W. Garrett, whereupon, on motion it was *resolved:* That the gift by Mr. Garrett to this University of the portrait of the late Johns Hopkins, a picture admirable both as a work of art and as a faithful likeness of the founder of the University, is gratefully acknowledged by the Board; and the President of the Board of Trustees is requested to acknowledge the gift, and convey to Mr. Garrett the thanks of the Trustees; and the President of the University is requested to give it a prominent place in the building of the University.

UNIVERSITY ROOMS AND HOURS.

The rooms marked by numbers are in the University Buildings, corner of Howard and Ross Streets, and those indicated by letters are in 113 West Monument Street, between Eutaw and Garden Streets.

Consultation Hours.

Saturdays and Sundays are excepted.

The President and members of the Academic Staff will receive students and other persons desiring to consult them, at the hours and places indicated in the following schedule.

For the economy of time, on the part both of the Faculty and of the students, it is particularly requested that official consultations be made, except in special emergencies, as appointed below.

PRESIDENT GILMAN is seldom absent from the buildings between 9. A. M. and 2 P. M., and is often in his office during the afternoon. Routine business and matters of minor importance may be brought to his attention orally, between 12 and 1 P. M., or at other times by notes and memoranda left with the clerk in the Registrar's office.

ADAMS, H. B., Associate in History, *Registrar's Office*, 9 A. M., and 5 P. M.
ADAMS, H. C., Lecturing on Political Economy, *Registrar's Office*, 9 A. M.; 132 *W. Madison St.*, 12 M.
BRANDT, H. C. G., Associate in German, *Room A*, 11 A. M.
BROOKS, W. K., Associate in Biology, *Biological Laboratory*, 10 A. M.
BROWNE, W. H., Librarian, *Library*, 9 A M.–5 P. M.
COOK, A. S., Associate in English, *Room B*, 4 P. M.
CLARKE, S. F., Assistant in Biology, *Biological Laboratory*, 10 A. M.
CRAIG, THOMAS, Lecturing on Mathematics, *Room* 16, *Tuesday, Thursday and Friday*, 4 P. M.
CROSS, J. M., Associate in New Testament Greek, *Room F*, 10 A. M.
ELLIOTT, A. M., Associate in Modern Philology, *Room B*, 1 P. M.
FRANKLIN, F., Assistant in Mathematics, *Room* 16, 12 M.
GILDERSLEEVE, B. L., Professor of Greek, *Room* 14, 11 A. M.
HASTINGS, C. S., Associate in Physics, *Room* 4, 11 A. M.
MARCOU, P. B., Assistant in French, *Room C*, 1. P, M.
MARTIN, H. N., Professor of Biology, *Biological Laboratory*, 12 M.
MORRIS, C. D., Professor of Greek, *Room B*, 11 A. M.
MORSE, H. N., Associate in Chemistry, *Chemical Laboratory*, 11 A. M.
PEIRCE, C. S., Lecturer on Logic, *Room C*, 9 A. M.
REMSEN, IRA, Professor of Chemistry, *Chemical Laboratory*, 11 A. M.
ROWLAND, H. A., Professor of Physics, *Physical Laboratory*, 9 A. M.
SEWALL, HENRY, Associate in Biology, *Biological Laboratory*, 12 M.
STOCKBRIDGE, G. H., Assistant in Latin, etc., 209 *N. Howard Street*, 2 P. M.
STORY, W. E., Associate in Mathematics, *Room* 15, *Tuesday, Wednesday and Thursday*, 11 A. M.
SYLVESTER, J. J., Professor of Mathematics, *Room* 17, *Tuesday and Friday*, 2 P. M.; *Mt. Vernon Hotel, daily*, in the morning.
WARREN, MINTON, Associate in Latin, 123 *W. Madison Street*, 2 P. M.
WOODWORTH, C. L., Instructor in Vocal Culture, *No.* 205 *N. Howard Street*, 2.30 P. M.

Treasurer's Office.

MR. C. J. MEYER will be in attendance in the Treasurer's Office, in the University Buildings, 9 to 11 A. M., 3 to 5 P. M.

Registrar's Office.

This office is open daily, except Saturdays, from 9 A. M. to 5 P. M., and on Saturdays from 9 A. M. to 3 P. M., and from 4 to 4.30 P. M.

Receipt and Departure of Mails, Etc.

(Including Saturdays).

Mails are received from the Post-office at 9 A. M. and 4 P. M.
Mails are sent to the Post-office at 8 A. M., and 3 P. M.
Mails are sent to the Street Letter-Box at 12 M. and 6 P. M.
☞ Memoranda, notes, letters and parcels may be left at the Registrar's office to be distributed at 9 A. M. and 4 P. M.

Library and Laboratories.

The Library is open daily, including Saturdays, from 9 A. M. to 10 P. M.

The Biological Laboratory is open daily, excepting Saturdays, from 9 A. M. to 5 P. M.

The Chemical Laboratory is open daily, excepting Saturdays, from 9 A. M. to 5 P. M.

The Physical Laboratory is open daily, including Saturdays, from 9 A. M. to 5 P. M.

PEABODY INSTITUTE LIBRARY, (corner of Mt. Vernon and Washington Places), contains 70,000 volumes, and is open daily, from 9 A. M. to 9 P. M.

MERCANTILE LIBRARY, (corner St. Paul and Saratoga Streets), contains 40,000 volumes. The Library and Reading Rooms are open daily, to members, from 9 A. M. to 10 P. M. Subscription, five dollars per annum.

MARYLAND HISTORICAL SOCIETY LIBRARY, (corner St. Paul and Saratoga Streets), contains over 15,000 volumes, and is open from 10 A. M. to 2 P. M.

MARYLAND INSTITUTE LIBRARY, (Baltimore Street, opposite Harrison Street), contains 20,000 volumes, and is open from 9 A. M. to 9 P. M. Member's ticket, three dollars per annum.

BAR LIBRARY, (second story, Court House, corner Lexington and Calvert Streets), contains 8,000 volumes, and is open daily, from 9 A. M to 11 P. M.

MEDICAL AND CHIRURGICAL FACULTY LIBRARY, (122 W. Fayette Street), contains 3,000 volumes, and is open daily, from 9 A. M. to 6 P. M.

MARYLAND ACADEMY OF SCIENCES: MUSEUM, (32½ Mulberry Street, opposite Cathedral Street), is open daily, from 9 A. M. to 3 P. M.

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