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CALENDAR, 1884–85.

Tuesday, September 23.	**Current Academic Year Began.**
Tuesday, September 30.	**Instructions Resumed.**
Wednesday, December 24—Saturday, January 3.	**Christmas Recess.**
Monday, February 23.	**Commemoration Day.**
Friday, April 3—Monday, April 6 (inclusive.)	**Spring Recess.**
Monday, June 8.	**Examinations for Matriculation Begin.**
Friday, June 12.	**Term of Instruction Closes.**

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[Issued, March 11, 1885.]

REPORTS OF RECENT COMMUNICATIONS TO THE UNIVERSITY SOCIETIES.

SCIENTIFIC ASSOCIATION.

On the Number of Metameres represented in the Skull in the various Vertebrate Groups. By J. Playfair McMurrich.

[Abstract of a paper read at the University Scientific Association, February 4, 1885].

Since the time of Oken, who first suggested the segmented nature of the vertebrate skull, until the present day, there has been a tendency to add to the number of segments fused to form the complex cranium of a typical vertebrate. At first the relations of the various osseous elements only were taken into account, but later on the investigation was extended to include the cranial nerves, and still later Balfour's researches showed that still other segmental elements—the "head-cavities" and branchial clefts—should be considered. It was found that the osseous elements gave comparatively little insight into the true segmentation, and also that the cranial nerves as present in the adult did not truly represent the original segmental nerves, certain of them, notably the facial and auditory, being formed by a splitting of the primitive nerve, while the vagus was really made up of a number of nerve trunks which had fused together. From a consideration of these facts, the conclusion was arrived at that nine segments at least were represented in the skull—the vagus being supposed to represent four segments corresponding to the four posterior branchial arches and visceral clefts. Quite recently, however, Sagemehl (Morph. Jahrb. Bd. IX.), from a study of the cranium of *Amia*, has arrived at the conclusion that three nerves which issue from the skull in that form behind the opening for the vagus—two of which are similar in their mode of origin to spinal nerves and are in relation to partially degenerated vertebrae—in the Teleostei pass up into the skull and become incorporated with the vagus, so that a Teleostean skull is comparable to that of an Elasmobranch, with the addition of three segments, represented by the three anterior spinal vertebrae in these lower forms. According to this theory, the cranium of the Teleosts would correspond to twelve segments, or since there is reason to believe that the vagus represents more than four primitive nerves, it would be better to say at least twelve.

I have lately, however, worked out the distribution of these three nerves in connection with the study of the cranial musculature in *Amia*, and, from my observations, I am strongly inclined to doubt the correctness of Sagemehl's theory. The first nerve, which represents only a ventral root, after passing down some distance, unites with the second. This, arising by two roots, just as a spinal nerve, and passing out in front of a rudimentary vertebra, is distributed to the hyopectoral (sternohyoid) muscle, while the third also, exactly like a spinal nerve, after passing downwards and backwards, unites with the next succeeding nerve, which is a true spinal, and passes to the musculature of the pectoral fin.

If now one examines the innervation of the corresponding muscles of a Teleost, one will find that they are supplied by branches from the first spinal nerve, which passes out in front of the first vertebra, or, in some cases, secondarily through the ex-occipital (*i.e.*, the arch of the preceding vertebra), and in certain forms we can discover more or less distinct traces of a composite origin of this nerve. It must, I think, be concluded from this that the second and third at least of these post-occipital nerves of *Amia*, instead of having been taken up into the skull in Teleostean descendants, have passed backward and fused with the succeeding spinal nerve, and that their corresponding arches likewise, instead of being added to the skull, have simply been dropped out of the series, or have remained free. The first of the three nerves, which has only a ventral root and which has no corresponding vertebra, but passes out by a separate opening through the ex-occipital, may perhaps represent one or more of the separate vagus roots seen in Elasmobranchs, which it resembles very closely.

With regard to the centra, there are no mechanical difficulties in the way of their passing forwards and fusing with the original basi-occipital, although the nerves pass backwards. That such may have been their fate is seen in the case of *Acipenser*, which also preserves these post-occipital nerves, and in which the notochord is surrounded by a streak of true cartilage at an early stage, which anteriorly is continuous with the parachordal cartilages. (Parker, Phil. Trans. 1882). The neural arches make their appearance before the centra, and the basi-occipital and the anterior vertebral centra may ossify as a whole without the individual centra being indicated, so that their neural arches would come to stand over what was apparently the simple basi-occipital. The elongation of the basi-occipital behind the ex-occipital, to be seen in *Acipenser* and *Amia* and still more noticeably in *Lepidosteus*, would stand in confirmation of this. The Ganoids are usually recognized to be the ancestral types of the Teleostei, *Amia* being an intermediate form, so that it can be supposed that the arrangement of their post-occipital nerves and vertebrae is intermediate between that of the Elasmobranchs and that of the Teleosts, and it may be concluded that the basi-occipital of a Teleost is comparable to that of an Elasmobranch *plus* two vertebral centra, but the nerves corresponding to these do not also pass up into the skull, but pass backwards to become fused with the first spinal nerve.

In Urodelous Amphibia the first spinal nerve, passing out in many cases through the arch of the first vertebra, and the second, passing out in front of the second vertebra, have a distribution essentially the same as that of the two posterior post-occipital nerves of *Amia;* in the Anura the first nerve has entirely disappeared, the apparent first nerve being really the second which has assumed the functions of the two nerves of the Urodela. Accordingly, the first spinal nerve of the Teleostei is equivalent to the first three nerves of the Amphibia. In the higher forms—the Sauropsida and the Mammalia—one or perhaps all of these three nerves are taken up into and incorporated with the cranium, forming the hypoglossal.

The skull is segmentally an homologous structure in the Elasmobranchs, Ganoids, Teleosts, and Amphibia, but in the Sauropsida and Mammalia includes more segments, represented by the hypoglossal nerve, so that the skull of these groups is equivalent to that of the Ichthyopsida *plus* a certain number of additional segments.

PHILOLOGICAL ASSOCIATION.

The Lessons of the Peloponnesian War as developed in the Speeches of Thucydides. By A. H. Huizinga.

[Abstract of a paper read before the University Philological Association, January 9, 1885.]

The object of the investigations embodied in this paper was to ascertain whether in the body of speeches which Thucydides inserts in his history there is any organism, any completeness as to the ground which they cover and the themes of which they treat. The question was suggested whether in these themes, or in the situations in which the speeches take their rise there is any repetition, and if it was found that the speeches constitute a body in which every question involved in the war received its due attention and no more than its due, whether this would not throw light on the real reason for the absence of speeches in the eighth book of his history.

From an examination of the character and contents of the speeches, we group them as follows:

I. Those which cluster round the opening of the war, comprising all the speeches of the first book and two speeches of Pericles in the second.

We have ten important speeches in this group, all introductory, all bearing upon the opening of the war, but each one taking up a different phase of that opening and the causes that led to it. The first speeches, in which the Corcyraeans seek an alliance with Athens, and the Corinthians oppose such an alliance, are not only connected with the immediate occasion of the war, but reach down to the very deepest questions then agitating the Hellenic world, the question of justice and of interest,—of autonomy and of union. The first speech of the Corinthians at Sparta is occupied with the general comparison of the Athenians and Lacedaemonians; the speech of the Athenians immediately following, sets forth the growth of the Athenian empire and the speech of Archidamus details the policy of the Lacedaemonians, while Sthenelaïdas insists on their duty to their allies. Next, two speeches enlarge on the prospects and resources of both parties, in view of the war, the Corinthians for the Peloponnesians and Pericles for the

Athenians; and finally two further speeches of Pericles, the one on the policy of Athens, the other on his own personal share in the shaping of that policy.

II. Those which are concerned with the progress of the war. And under this we have the following sub-divisions.

a. The military speeches. In this group we have one speech (Archidamus to his soldiers), at the general opening of the war, corresponding to the speech of Nicias to his troops at the commencement of the military operations of the Sicilian expedition. We have one speech of Athenian arms against Spartans, and one of Spartan arms against Athenian, (Demosthenes iv: 10. Brasidas, v: 9,) and each at a most appropriate occasion. The first naval battle is distinguished by one speech on the Lacedaemonian and one on the Athenian side. We have two speeches considering the two sides of Bœotian relations to Attica; one on the superiority of the Greek modes of fighting the barbarian; two on the issue of the final struggle of the Sicilian expedition, one presenting the Athenian, the other the Syracusan view of that issue, and finally one on the retreat of the Athenian army which is to end in their destruction.

As relating to the progress of the war, though not exactly a military speech, we may also classify the speech of the Lacedaemonian ambassadors seeking for peace.

b. The Sicilian expedition is presented from almost every possible side. Hermocrates, at Gela, presents the Pan-Sicilian interests of the question. Three speeches in the Athenian assembly presenting, respectively, the conservative, the radical, and the military sides of the question, are balanced by three similar speeches in the Syracusan assembly. At Camarina we have two speeches, the one (by Hermocrates) presenting the Sicilian, the other (by Euphemus) the Athenian interests before a Sicilian audience, and finally one speech (by Alcibiades) on this expedition as affecting Lacedaemonian interests.

c. The development, changes and decay of the Athenian empire, including also the relations of other Greek States to Athens, such as Plataea. The speeches which bear upon the growth of the Athenian empire have already been classed as more properly belonging to the first division. This leaves us one speech of an ally seeking to revolt from Athens, (Mytilenaeans), one of the Spartans seeking to induce an ally to revolt, (Brasidas); two speeches presenting the different sides of the question of the punishment of revolt; and finally the dialogue of the Athenians and the Melians as marking the last real conquest of the Athenians, and the last extension of the empire. In this division we also place those speeches which relate to the history and place of Plataea, the dialogue of Archidamus and the Plataeans, the speech of the Plataeans, and the answer of the Thebans.

We think that this grouping sufficiently shows that in the selection of themes and situations for the speeches there is a method, that this method is to present the distinct sides of every question or phase of the war in as many distinct speeches, and that within certain limits the treatment is meant to be exhaustive. Whether this throws any light on the absence of speeches in the eighth book must still be considered an open question.

On the Etymology of Hybrid (Lat. Hybrida). By M. WARREN.

[Abstract of a paper read at the meeting of the University Philological Association, January 9, 1885].

The usual derivation of *hybrida* (from Greek ὕβρις) was discussed, and attention called to a new explanation attempted by Keller, Epilegomena zu Horaz, Sat. I, 7, 2: "Wie *pumilio* aus Πυγμαλίων, *Cocles* aus Κύκλωψ, so ist *Hybrida* aus Ὑπερίδης Ὑπερείδης hervorgegangen und aus einem Eigennamen zum Appellativum geworden. Wahrscheinlich war *Hybrida* zufällig bei einem Komiker der Name eines Bastards und dann zunächst Beiname eines Menschen und später allgemein adjectivisch verwendet wie *Cocles*." Saalfeld in his recent Tensaurus Italogræcus, p. 550, adopts this view with a word of caution. The following passages were cited to show that under *Hybrida*, the Romans understood strictly speaking the progeny of a *sus* and an *aper*. Pliny VIII, 213. Isidorus Orig., XII, 1, 61. Eugenius, in Latin Anthology of Meyer, Vol. I, No. 387, and Martial, VIII, 22. Hesychius has a gloss ἰβρίκαλοι: χοῖροι. Curtius in Studien, I, p. 260, has connected the stem ἰβρο with *apro*. *Hybrida* is therefore a compound of ὗς + ἴβρος = *sus* + *aper*. υ + ι would regularly give ῡ as in βοτρύδιον. Similar compounds are χοιρέλαφος, λυκοπάνθηρ, κυνόλυκος, λεόπαρδος (cf. Isidorus Orig., XII, 2, 11. Leopardus ex adulterio leænæ nascitur et pardi). *Hybrida* stands in the same relation to *hybris*, as *absida* to *absis*, *magida* to *magis*, *cassida* to *cassis*, etc. For a somewhat fuller statement, see *American Journal of Philology*, Vol. V, p. 501 f.

NATURALISTS' FIELD CLUB.

Dykes of apparently Eruptive Granite in the neighborhood of Baltimore. By G. H. WILLIAMS.

[Abstract of a paper read before the Naturalists' Field Club, December 17, 1884].

Within the area of ancient and highly crystalline rocks occurring in the immediate vicinity of Baltimore, there are many of undoubtedly igneous origin. Aside from the extensive area of black, basic gabbros situated west and north-west of the city and the numerous dykes of still more basic olivine rocks which intersect them,* coarse grained granites of the most acid character may be seen at several localities, where their mode of occurrence is such as to render their eruptive nature at least probable. The gabbros, or "niggerhead rock" as it is locally called, seems to have been intruded into the gneisses and schists which surround it in the form of a huge boss or "stock" covering many square miles. This eruption must further have taken place at a period anterior to the folding and crumpling of the gneisses, inasmuch as these black rocks show abundant evidence of having been subjected to the same enormous pressure and are often banded or schistose in a direction conformable to the bedding of the gneiss. The origin of the granite, however, was probably subsequent to this great upheaval, as it shows no indications of ever having been forcibly compressed.

The intrusion of granite may have been a direct consequence of the crumpling and dislocation of the gneissic strata, it having been forced with such violence into the rents and fissures then formed that cracks of even microscopic dimensions were filled with the plastic magma, while huge dykes of the same material strengthened and cemented the whole fractured mass of schists. Furthermore the extreme coarseness of the grain would seem to indicate that the granite now exposed to view cooled at a great depth below the surface.

Occurrences of apparently eruptive granite are numerous in Baltimore and its neighborhood, but two especially typical localities, both very easy of access, exhibit the exotic nature of this rock in such perfection as to deserve a particular description. The first of these is on the east side of Jones Falls, a short distance above the Preston street bridge. At the base of the old bridge buttress where what was formerly known as the Belvedere Road crossed Jones Falls between Preston and Hoffman streets, a small area of highly tilted, finely banded hornblende gneiss is exposed which strikes N 70° E and dips 60°–70° N 20° W. This small exposure is intersected by a dyke of flesh-colored coarse grained granite of which about 25 feet are in sight. The direction of this dyke is curving. For about one-half of its length it is conformable with the strike of the gneiss and may also be seen to emerge from below parallel to its dip. For the remainder of its course, however, it cuts across the strike, making an angle with it of about 30°. Bands of the gneiss, seen to terminate abruptly on one side of the dyke, continue their course from the other side. The width of the dyke is from $2\frac{1}{2}$ to 6 feet. Its line of contact is so sharp and its color contrasts so forcibly with that of the black hornblende rocks, that it, at first sight, looks like a huge snake lying on them. The rock itself is a muscovite-granite no longer altogether fresh. The mica throughout has become green in color and the feldspar is dull and opaque. The structure is coarse and very uniform, no variations in grain being anywhere observable.

A second and much more important exposure of similar granite dykes intersecting highly tilted hornblendic schists, is on the main stem of the Baltimore and Ohio Railroad in the valley of the Patapsco River, near Orange Grove. A great amount of granite is exposed between this point

*See *University Circular* No. 30, April, 1884, p. 79.

and Ilchester by the railroad excavations, but at one particular spot, a few hundred yards west of Orange Grove Station, its apparently intrusive character is most admirably exhibited. Here hornblendic schists and gneisses, with an occasional micaceous band, dip 60°–70° S 35° W, and strike N 55° W. At one point a coarse grained granitic mass 18 feet in width, emerges from the ground, like the trunk of a huge tree, following very nearly the dip of the schists. From this, two lateral branches are given off on each side, the lower being in both cases much the smaller. This lower branch on the east side is only 3½ feet wide at its origin and may be traced for a distance of 67 feet in a perfectly horizontal direction, cutting the bedding of the schists almost at right angles. On the west side the lower arm is 4 feet wide at its origin and is visible for 150 feet. This is also horizontal in its course and at its extremity is not over 5 inches wide. Both of these arms enclose several fragments of the schist which seem to have been torn off of the main mass and imbedded in the granite. The liquidity of this rock as well as the pressure under which it was erupted, may be inferred from the minute—often microscopic—cracks and fissures into which it has penetrated. Both of these arms exhibit in the most admirable manner the effect of the rapidity of cooling upon the structure. In the centre they are exceedingly coarse-grained, a single crystal of feldspar having been measured and found to be 13 inches in length. Toward the edge, however, they become finer grained, and on the immediate contact it is often not easy to distinguish the separate constituents.

The main trunk of granite, which is about 18 feet wide, ascends along the dip of the schists for 13 feet above the lower branches, and then gives off two other lateral branches, parallel in direction to the lower ones, but much wider. The one on the west side measures, in its widest place, 22 feet. Above this point the main trunk breaks into several smaller branches of different sizes, which ascend by different courses to what is now the surface of the ground. The entire height of this profile is 64 feet.

The main mass exhibits all the phenomena, on an even larger scale, which are displayed by the lower branches. Inclusions of schist are common; one in the main trunk measuring 14 feet in length and 2½ in breadth. The contact between the schist and granite is always very sharp. By contraction the latter seems sometimes to have shrunk away from its enclosing rock and a fissure may be seen between the schist and granite. In one place the schist has been bulged out by the superincumbent weight of the granite resting upon it.

The rock of these dykes—if dykes they be—is a muscovite-granite composed of quartz, microcline, albite, muscovite, and often containing sharp crystals of red garnet. No biotite was observed. The optical angle of the muscovite measures 63° in the air; the microcline has an extinction angle, measured against the cleavage lines, of 15° on OP and 7° on $\infty P\breve{\infty}$; the albite of 4° on OP and 14° on $\infty P\breve{\infty}$. The former feldspar is flesh colored, the latter pure white.

There are many other similar occurrences of coarse grained muscovite granite exposed in the schists along the line of the B. & O. R. R., east of Orange Grove as far as Relay Station; one between the former place and Avalon contains black tourmaline. The same rock also appears at many points in the bed of Gwynn's Falls as far north as Edmondson Avenue, and in one place in the gabbro area, one-half mile west of Mt. Hope. It is common, in this country at least, to regard all such occurrences of coarse granite as segregation veins, formed by the leaching out of the schists of their most soluble compounds, especially potassium-silicates, and the subsequent deposition of these in pre-existing cracks and fissures. The possibility of such fissures having been filled by the injection of liquid granitic material from below is however generally recognized abroad, and in the two localities described above, the form of the dykes, the structure of the rock and the inclusions of schist all seem to point to such an origin. Indications of any contact metamorphism by heat could scarcely be expected where the surrounding rocks were already so highly crystalline. The writer hopes that more detailed study of these interesting exposures may in future throw more certain light on the mode of formation of the granite.

PROCEEDINGS OF SOCIETIES.

Scientific Association.

February 4.—Sixty-second regular meeting. Professor Martin in the chair. Forty-four persons present.

Papers read:

The Theory of the Vertebrate Skull, by J. P. McMurrich. (*Abstract on p.* 64.)

On the possibility of applying Mathematics to Political Economy, by S. Newcomb.

On the Change of Color in Anolis, by H. H. Donaldson.

Philological Association.

February 6.—Fifty-ninth regular meeting. Professor Gildersleeve in the chair. Thirty-nine members present.

Papers read:

The Western Readings of the New Testament, by J. R. Harris.

The Probable Sanskrit Equivalent of the Greek Particle ἄρ, ῥα, by M. Bloomfield.

On Some Oracles in Herodotus, by W. M. Arnolt.

Historical and Political Science Association.

January 9.—Dr. H. B. Adams in the chair.

The Study of the Constitutional and Political History of the Individual States, by J. F. Jameson.

United States Notes, by R. T. Ely.

January 16.—Dr. H. B. Adams in the chair.

Progress of Coöperation in England, by R. T. Ely.

The Land-Laws of the United States, by S. Sato.

January 23.—Dr. H. B. Adams in the chair.

The State Constitutions of the Revolutionary Period, by J. F. Jameson.

Railroad Tariff in Germany, by R. T. Ely.

January 30.—Dr. H. B. Adams in the chair.

Project of a Communistic Society in Mexico, by S. Sato.

The Reception of the Massachusetts Constitution of 1780 by the Towns, by J. F. Jameson.

February 6.—Dr. H. B. Adams in the chair.

Jevons' Investigations in Currency and Finance, by Davis Dewey.

Newcomb on Mathematical Economy, by C. H. Levermore.

The Slaveholders' Convention at Annapolis in 1841, by Jeffrey Brackett.

The B. & O. Relief Association, by R. T. Ely.

February 13.—Dr. H. B. Adams in the chair.

The Study of Political Science in American Colleges, by Professor E. J. James, of the University of Pennsylvania.

February 20.—Dr. H. B. Adams in the chair.

City Government of Chicago, by F. H. Hodder.

Introduction to the Study of Administration, by R. T. Ely.

Metaphysical Club.

January 27.—Forty-first regular meeting. Professor Hall in the chair. Twenty-three members present.

Papers read:

The Introspective Method, by A. H. Gross.

On the newly-discovered Organs of the Heat Sense, by H. H. Donaldson.

Demonstration of Logical Machines, by J. Jastrow.

The Method of Philosophy, by G. S. Morris.

Baltimore Naturalists' Field Club.

December 17.—Dr. Williams in the chair. Twenty-one members present.

Paper by Dr. G. H. Williams on Eruptive Granite in the neighborhood of Baltimore. (An abstract is given on page 65 of this *Circular*.)

Mr. H. H. Donaldson reported some work on the Anolis, the American Chameleon. The range of color in this animal is between a brilliant green and a deep chocolate brown, though it naturally suggests itself that this change is of use to the animal in allowing it to assume colors which would protect it, yet all the experiments made fail to give any support whatever to this idea. The color can be regulated by certain conditions, among which temperature and moisture are the most important; below about 6° C. the animal is always brown, above that point it is green. Light has no effect. The green color is the passive one, while the brown indicates that the chromatophors are being in some way stimulated. The investigation will be continued.

Mr. F. H. Herrick reported a preliminary list of the Oaks around Baltimore, as follows: Quercus alba, Q. obtusiloba, Q. phellos, Q. aquatica, Q. nigra, Q. falcata, Q. coccinea, Q. rubra.

January 21.—Dr. Williams in the chair. Sixteen members present.

Communications were presented:

On the Characteristics of the Fauna and Flora of the region around New Orleans, by Otto Lugger.

On the Retention of the Leaves by Certain Oaks during the Winter Months, by B. W. Barton.

Mr. Basil Sollers exhibited a collection of Indian relics found in Maryland.

NOTES FROM THE UNIVERSITY LABORATORIES.

BIOLOGICAL LABORATORY.

Preliminary Notes on the Echinoderms of Beaufort.

By HENRY F. NACHTRIEB.

Recent work on the morphology and embryology of invertebrates, and the speculations on the phylogeny and relationships of the various classes of animals now claiming the morphologist's consideration make a coherent history of the evolution of the Echinoderms very desirable, and especially as no satisfactory explanation (so far as I know) of this interesting class of invertebrates has ever been given. From what has been done it is evident that before we can safely speculate on the relationships of Echinoderms to Nemerteans, etc., we must get a clear understanding of the evolution of the class itself. Towards this understanding no two investigators have contributed more than Johannes Müller in his memoirs, and Ludwig in his classical "Beiträge." But much remains yet to be done, and it was with a view to add something to our knowledge of this group that I began my work, at the suggestion of Dr. Brooks, at Beaufort early last June. These notes are rather an earnest of what is to be than a synopsis of what has been done.

The Echinoderms of Beaufort represent all the orders except the Crinoids, and with one or two exceptions are abundant, easily obtained, and in their variety offer excellent material for comparative work and for the solution of puzzling and important questions.

The star-fish are represented by Asterias Forbesii, Luidia clathrata, Astropecten articulatus, and an undetermined species of which I found only one specimen. This specimen was closely related to Luidia and Astropecten, and may prove to be a cross between the two—which surmise suggests some experiments in a field which certainly is promising. Of the Ophiurids great numbers of Ophiothrix angulata are found in the cavities of the sponges so abundant in certain parts of the harbor, some Ophiophragma Wurdemanii Lyman are found in the sand on Shark Shoals. Great numbers of Ophiura olivacea are found among the eel grass in various parts of the harbor, and one undetermined species was dredged in deep water. The Echinoids are represented by thousands of the Clypeastroid, Mellita petapora Lütk., commonly known as the sand dollar, great numbers of Sea Urchins, Arbacia and Strongylocentrotus, and by one Spatangoid, Moira atropos, which is common in the sand on Shark Shoals. The Holothurians are represented by Synapta and several undetermined species.

When I arrived at Beaufort last June the sand dollar was spawning, and I accordingly began my work on it. The eggs when laid are surrounded by a gelatinous membrane in which are lodged numbers of large purplish red pigment granules which vary in size and shape and are always more or less angular. Fertilization takes place through this membrane. In no case could I see anything like a polar globule. The first two planes of segmentation (meridional) and the third, which is equatorial, divides the egg into eight blastomeres of equal size—occasionally the four at one pole are a trifle larger than the four at the opposite pole. After eight blastomeres are formed irregularities in segmentation begin, but as I did not pay special attention to segmentation I shall not attempt a description of the process.

After the blastosphere is formed each cell acquires a cilium, the larva then begins to rotate within the membrane and at length wears through one portion of it and then escapes into the water. It is generally stated that the blastosphere and gastrula of Echinoderms is uniformly ciliated. This, I am prepared to say, is not altogether true—at least it is not true for all the forms studied at Beaufort.

At the pole opposite to where the blastopore is formed is a small circular area in which the cilia are longer, stronger, and less active than those at any other point of the larva. When the gastrula is swimming these long cilia are directed forwards, now and then sway to and fro slightly, but never aid in propelling or turning the larva, apparently being inactive except that occasionally they seem to act as sensory cilia. In some few cases this area with the long cilia was somewhat thicker than the neighboring ectoderm. This thickening of the ectoderm and greater length of cilia over this thickened area was very marked in many Strongylocentrotus gastrulae, and it was always easily recognizable in Ophiothrix, and was well marked in Moira. Nothing of the kind was observed in the few star-fish gastrulae I was able to get. That we have here to do with a differentiation peculiar to this part of the larva only, and that it is to some extent comparable to the region of the praeoral tuft of cilia of other larvae is shown by the fact that it is marked some time before the larva escapes from the membrane, and that it exists long before there is the slightest indication of the posterior and the unmistakable anterior ridge of the ciliated band of the future Pluteus. And that it is not an optical delusion due to a difference in the rapidity and manner of vibration of the cilia in different parts of the larva is proven by specimens killed on the slide with osmic acid or other hardening fluid. How much importance can be attached to this fact will be discussed in a later paper. In passing I would, however, here point out that it is possible to explain the praeoral band of cilia of Bipinnaria as a modified form of this group of long cilia, and that in those forms where we have but one band of cilia these long cilia of the gastrula have merged into the anterior ridge of cilia, which then united with the postoral ring. The body cavity and water vascular system of Mellita is derived from a two-horned diverticulum of the entron, just as in Strongylocentrotus. In Moira the process of segmentation, which is regular only up to eight blastomeres, leads to a blastosphere, this to a bilaterally symmetrical gastrula which gradually develops into a nine armed Pluteus, the posterior unpaired arm arising soon after the two ventral ones. No polar globules were seen. The body cavity and water vascular system arise as they do in Mellita. A phenomenon observed one day while fertilizing some immature eggs of Moira deserves mention here. The immature eggs have a clear distinctly visible nucleus and a number of clear spaces of varying sizes. Some of these eggs were mixed with active spermatozoa, and in a few moments after the spermatozoa had been added quite a number of pseudopodia were thrust through the egg membrane, which, after having felt about a short time, again slowly withdrew themselves. The eggs did not undergo segmentation and some hours later disintegrated. A want of time did not permit me to experiment in this direction.

The small opaque eggs of Ophiothrix always threw off two polar globules after being mixed with the male fluid. The first two planes of segmentation are meridional, the third is equatorial. The eight blastomeres are equal in size. As in the cases mentioned above, so here segmentation begins to be irregular. In the cases that came under my observation the segmentation of Ophiophragma was regular till four blastomeres had been formed. These eggs were obtained but a few days before my departure, and owing to circumstances I could not follow the segmentation any farther at the time, and then southerly winds and high water cut off my work so that I was able to get only the latter half of the development of the eggs I had obtained one afternoon from some of the Ophiurids I had in an aquarium. The eggs were laid in the afternoon about four o'clock, and early next morning the larva already had passed the important stages. One interesting thing was noticed in the segmentation so far as observed. The first two blastomeres before completely separating were connected at their middle points by a spindle-shaped body which was finally constricted off, the two blastomeres having widely separated from each other, and then gradually came towards the surface, became spherical and looked very like a polar globule. The blastomeres rounded out, and again approached each other. Each next divided into two, a body similar to the one mentioned above being given off between each pair of blastomeres, which again widely separated from each other, rounded up and then approached each other again. At this stage I was obliged to leave. Whether what I saw was the result of a pathological condition or not I cannot say. The larvae I found in my aquaria the next morning were pyramidal bodies, somewhat flattened, drawn out gastrula-shaped bodies of which the anterior bluntly-pointed half was transparent, consisting of a single layer of ciliated ectoderm cells around a cavity in which were branched mesoderm cells, and of which the posterior broad end with the blastopore was dark, quite opaque, and already had established in it the enteron with its diverticula. The Ophiurid developed entirely in this posterior half of the larva. The anterior transparent half was gradually resorbed and so far as observed no special invagination for the mouth obtained. On the Starfish observed I have nothing new to add at present.

A few words on the phyllogeny of the Echinoderms. If we compare the origin of the body cavity and water vascular system in the different classes, we see that in the Holothurians we have one median pouch given off from the enteron, and that it, by division, gives rise to the body cavity and water system. In the Echinoids there is a two-horned pouch given off. In the Starfish there are two separate lateral pouches given off, of which the left gives rise anteriorly to the water system, and the right and the posterior part of the left become the body cavity. In Ophiurids so far as known there are two separate pouches, both of which divide, the anterior part of the left becoming the water system, the anterior of the right atrophying, and the posterior parts of the right and left becoming the body cavity. In the Crinoids there are first given off two separate pouches which become the body cavity, and then a single one that becomes the water system. Assuming that the story of the Ophiurids and Crinoids is correct, we have here a rising scale, in which the Holothurians occupy the lowest, the Starfish the middle, and the Crinoids the highest position. In favor of this there are some anatomical facts. The objections of palæontology are not very difficult to answer. In assuming the Holothurians as the primitive forms it is not necessarily implied that the line of development be a straight one, as it is represented above. It is quite probable that the line began to break with the appearance of the Starfish.

CHEMICAL LABORATORY.

Specimens illustrative of Lehmann's work on the Origin of the Crystalline Schists.

Dr. Johannes Lehmann, formerly of Bonn, but now professor of Geology in the University of Breslau, has recently sent to the writer a most admirable suite of rock specimens illustrative of his extensive work on the Origin of the Crystalline Schists.* All who have seen this superb book, cannot but have admired it, while those who have carefully read it will have discovered a wealth of original observations and most suggestive conclusions. It is without doubt the most important contribution which has lately been made to the literature of metamorphism. The photographs are the most successful attempts to illustrate rock structures which have thus far been published, being in large part taken from polished surfaces by reflected light. They cannot, however, take the place of actual hand specimens of the rocks, and it is therefore a matter of interest that a set of the latter is accessible in the Petrographical Laboratory of the University. The collection contains sixty-three pieces; of these, fifty were selected by Dr. Lehmann from the stock of the firm of Krantz & Co., in Bonn, while the remainder were taken directly from his own private collection. Some are polished and bear upon their label the statement that they are part of specimens used in preparing the photographs and are hence most valuable as types.

The importance of such a collection—without doubt the only one of the kind in the United States—to illustrate this great work, needs no further comment here.

Geo. H. Williams.

*Untersuchungen über die Entstehung der altkrystallinen Schiefergesteine mit besonderer Bezugnahme auf das sächsische Granulitgebirge, Erzgebirge, Fichtelgebirge und bairischbömische Grenzgebirge. 4°. Bonn, 1884. 278 pp. 5 copperplates and an atlas of 159 photographs.

RECENT PUBLICATIONS.

Congressional Government: a Study in American Politics. By Woodrow Wilson, Fellow in History, Johns Hopkins University. (Boston, Houghton, Mifflin & Co., 1885, pp. 333, 16mo.)

[*The University Circular* for July, 1884, contains an abstract of the first two chapters of this book, which were read as essays before the Seminary of History and Politics, May 9 and 16, 1884].

The object of this book is to apply new methods of criticism to the Constitution of the United States. Hitherto all the commentaries on the Constitution have confined their view almost entirely to the political theories upon which it is based, to the formal amendments which have been added to it, and to the various judicial constructions which have been put upon its provisions; the author of this book endeavors to free himself from all prepossessions of theory and to discover the actual, operative divisions of power in the federal system, the growth of modifying precedent in legislation, the real forces that govern policy both in law-making and in administration, the present effectiveness of various parts of the constitutional machinery of election, and the existing conditions under which all the functions of the national government are exercised.

The cardinal fact disclosed by this study is, that Congress not only discusses and determines, but also *originates* all federal policy. Its complete separation from the Executive renders coöperation between the two departments impossible, or at least highly inconvenient and therefore impracticable. The result has been two-fold. In the first place, the Executive, having in practice no voice, either of consultation or suggestion in the legislative direction of affairs, has been reduced to the position of mere servant of Congress. The President can in some cases, by the use of his veto, make his opinion felt as to what ought not to be done, but he can in no case gain a favorable hearing as to what ought to be done. In the second place, Congress, being too numerous a body to do its own framing of bills and planning of policy, has adopted the device of dividing itself into a great many Standing Committees and entrusting to each one of these Committees the origination of measures of a certain class. These Committees have come to exercise, in the course of a practice which has built up a vast body of most complicated rules with the prime object of hurrying business,—a most despotic power of dictation. They are "little legislatures," and, each within its own province, generally determines what the action of the Houses shall be. They are most despotic in the House of Representatives, whose rules allow them to control debate, amendment, and the whole course of business. In the Senate they are much more under command; the comparatively small membership of the Senate enables it to select its Committees by ballot and to debate their reports with freedom. The House of Representatives delegates its Speaker to appoint its Committees, thereby constituting him the most powerful man in the government. He selects the men who determine legislation.

The subordination of the Executive to Congress is further illustrated in the relations of the President and the Senate in the matters of appointments to office and the ratification of treaties. Here, as in other things, the President has to submit to the decisions of the legislative will as to the decisions of a master.

The result of this concentration of all the motive power and all the real control of policy in the hands of Congress is that its proper functions are taken from it, and all its energies absorbed in the performance of functions for which it is much less fitted and for whose proper exercise it cannot be made adequately responsible. It is maintained that a numerous popular body is eminently well qualified to criticise and pass upon plans submitted to it by administrative officials who are in contact with the actual work of government, but eminently unfit to originate such plans for itself. By undertaking the latter task which it cannot perform well, Congress has no time left for the work of criticism and judgment which it could do well, and in doing which it would perform its most essential duty of informing the nation of the course and motives of affairs. And it exercises the exalted power of initiation in policy without responsibility; for its policy is the patch-work of its committee reports. Forty-odd Standing Committees share, and by subdividing obscure, responsibility.

The author is careful to trace the effects of this system upon the public life of the country. A public man cannot win greater power than the Speakership in the House or chairmanship of an important Committee; the prize is too small and too doubtful to allure many gifted men into the public service. An opportunity to win great power is the only thing that will attract the best minds of the country; and great power with strict and sure accountability for its use are the only lasting elements of good government.

ENUMERATION OF CLASSES, SECOND HALF-YEAR, 1884-85.

Mathematics. (52 Students).

Classes meet in Rooms 8, 14, and 16.

Analytical and Celestial Mechanics: PROFESSOR NEWCOMB. Twice weekly, Tuesday and Thursday, 9 a. m. (9).

Barcroft.	Fields.	Mansfield.	Prentiss.
Cajöri.	Franklin.	Nixon.	Veneziani.
Duncan.			

Mathematical Seminary: PROFESSOR NEWCOMB. Weekly, Monday, 8 p. m. (9).

Barcroft.	Fields.	Mansfield.	Prentiss.
Cajöri.	Franklin.	Nixon.	Veneziani.
Duncan.			

Mathematical Seminary: DR. STORY. Weekly, Thursday, 8 p. m. (7).

Barcroft.	Faerber.	Nixon.	Veneziani.
Cajöri.	Fields.	Peed.	

Quaternions: DR. STORY. Three times weekly, Monday, Wednesday, and Friday, 12 m. (8).

Barcroft.	Faerber.	Lambert.	Nixon.
Cajöri.	Fields.	Love.	Peed.

Modern Algebra: DR. STORY. Twice weekly, Tuesday and Thursday, 12 m. (9).

Barcroft.	Fields.	Mansfield.	Peed.
Cajöri.	Love.	Nixon.	Veneziani.
Faerber.			

Introductory Course in Mathematics for Graduates: DR. STORY. Daily, 10 a. m. (6).

Barcroft.	Lambert.	Nixon.	Veneziani.
Cajöri.	Mansfield.		

Conic Sections: DR. STORY. Twice weekly, Tuesday and Thursday, 1 p. m. (14).

Crosby.	English.	McCulloch.	Taylor.
Dohme.	Ensey.	McPherson.	Trower.
Duffy.	Laessig.	Penniman.	Weech.
Eareckson.	Love.		

Mathematical Seminary: DR. CRAIG. Weekly, Friday, 4 p. m. (5).

Barcroft.	Fields.	Liebig.	Nixon.
Cajöri.			

Differential Equations: (*Boole*): DR. CRAIG. Twice weekly, Tuesday and Friday, 11 a. m. (10).

Ames.	Crew.	Gorton.	Love.
Barcroft.	Eichelberger.	Keilholtz.	McDaniel.
Blandin.	Gatewood.		

Linear Differential Equations: (*Briot, Bouquet, Fuchs and others*): DR. CRAIG. Three times weekly, Monday, Wednesday, and Friday, 11 a. m. (3).

Fields.	Nixon.	Veneziani.

Theory of Functions: DR. CRAIG. Three times weekly, Monday, Wednesday, and Friday, 1 p. m. (3).

Fields.	Nixon.	Veneziani.

Problems in Mechanics: DR. FRANKLIN. Twice weekly, Tuesday and Thursday, 12.30 p. m. (4).

Blandin.	Crew.	Gatewood.	Keilholtz.

Differential and Integral Calculus: (*Williamson*): DR. FRANKLIN. Three times weekly, Monday, Wednesday, and Friday, 1 p. m. (18).

Bell.	Ensey.	McCullough.	Trower.
Crosby.	Gross.	McPherson.	Weech.
Dohme.	Jastrow.	Penniman.	Wiegand.
Duffy.	Laessig.	Taylor.	Wingert.
English.	Love.		

Solid Analytic Geometry: (*Smith*): DR. FRANKLIN. Three times weekly, Monday, Wednesday, and Friday, 11 a. m. (11).

Ames.	Crew.	Keilholtz.	McDaniel.
Blandin.	Eichelberger.	Love.	Taylor.
Cole, A. D.	Gorton.	McCulloch.	

Analytic Geometry: DR. FRANKLIN. Three times weekly, Monday, Wednesday, and Friday, 4 p. m. (11).

Bevan.	Flexner.	Jones, W. A.	White.
Bromwell.	Hoffmann.	Mount.	Winslow.
Dashiell.	Jones, W.	Rowland.	

Physics. (70 Students).

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

Electricity and Magnetism: PROFESSOR ROWLAND. Daily, 10 a. m. (10).

Blandin.	Gatewood.	Leibig.	Morrill.
Crew.	Hall.	Mansfield.	Mumper.
Duncan.	Keilholtz.		

Laboratory Work: PROFESSOR ROWLAND. Daily. (8 advanced students).

Blandin.	Duncan.	Keilholtz.	Morrill.
Crew.	Gatewood.	Liebig.	Mumper.

Major Course: DR. KIMBALL. Lectures Tuesday and Thursday, 4 p. m. Laboratory work, Monday and Tuesday. (27).

Ames.	Eichelberger.	Horner.	Palmer, A. G.
Barcroft.	Fields.	Keilholtz.	Peed.
Black.	Gatewood.	Laessig.	Perkins, W. H.
Blandin.	Gorton.	Lambert.	Roberts, D. E.
Cajori.	Hayes.	Love.	Schubart.
Clark.	Hillyer.	McDaniel.	Stokes, H. N.
Cole, A. D.	Hobbs.	Mumper.	

General Physics: (*Minor Course*): DR. KIMBALL. Daily, 10 a. m. (35).

Applegarth, E. C.	Dreyer.	Loane.	Straus.
Armiger.	Ensey.	Lowndes.	Swartz.
Bayard.	Ferris.	McPherson.	White, E. L.
Birney.	Friedenwald.	O'Donovan.	Williams, J. W.
Bromwell.	Glenn, J.	Price.	Williams, L.
Carter.	Gordon, D. H.	Reese.	Williams, W. K.
Coates.	Hedrick.	Shemwell.	Willis.
Dashiell.	Hitchcock.	Stevens.	Wingert.
Dohme.	Lamb.	Stow.	

Laboratory Work: (*Class in General Physics*): DR. KIMBALL and DR. PERKINS. (35).

Applegarth, E. C.	Dreyer.	Loane.	Straus.
Armiger.	Ensey.	Lowndes.	Swartz.
Bayard.	Ferris.	McPherson.	White, E. L.
Birney.	Friedenwald.	O'Donovan.	Williams, J. W.
Bromwell.	Glenn, J.	Price.	Williams, L.
Carter.	Gordon, D. H.	Reese.	Williams, W. K.
Coates.	Hedrick.	Shemwell.	Willis.
Dashiell.	Hitchcock.	Stevens.	Wingert.
Dohme.	Lamb.	Stow.	

Chemistry. (66 Students).

Classes meet in the Chemical Laboratory.

Chemistry of the Carbon Compounds: PROFESSOR REMSEN. Daily, 9 a. m. (33).

Aber.	Gatewood.	Kastle.	Pleasants, J.
Bell.	Haldeman.	Laessig.	Riggs.
Brackett, R. N.	Hartogensis.	Liebig.	Roberts, D. E.
Caldwell.	Hayes.	McClintock.	Schaeffer, E. M.
Campbell.	Haynes.	Morrill.	Schubart.
Canfield.	Hedrick.	Mumper.	Slack.
Clark.	Hemmeter.	Palmer, C. S.	Trail.
Cole, A. D.	Hobbs.	Piggot.	Wallis.
Emerson, W. H.			

General Chemistry: DR. MORSE. Three times weekly, Monday, Tuesday, and Wednesday, 9 a. m. (23).

Applegarth, E. C.	Hough.	Penniman.	Wightman.
Buckler.	Mason.	Perkins, W. H.	Williams, J.
Coar.	McIntosh.	Smith.	Wingert.
Dohme.	McLane.	Swartz.	Winslow.
Friedenwald.	Mindeleff.	Stein.	Woods.
Hitchcock.	Mount.	Stokes.	

Laboratory Work: PROFESSOR REMSEN, DR. MORSE, and DR. KEISER. Daily. (61).

Aber.	Emerson, W. H.	McIntosh.	Schubart.
Applegarth, E. C.	Friedenwald.	McLane, A.	Simpson.
Bayley.	Gatewood.	Mindeleff.	Slack.
Bell.	Haldeman.	Morrill.	Smith.
Blandin.	Hartogensis.	Mount.	Stein.
Brackett, R. N.	Hayes.	Mumper.	Stokes, G. C.
Buckler.	Haynes.	Orndorff.	Swartz.
Caldwell.	Hedrick.	Palmer, A. G.	Trail.
Canfield.	Hemmeter.	Palmer, C. S.	Wallis.
Clark.	Hillyer.	Penniman.	Wiegand.
Coar.	Hitchcock.	Perkins, W. H.	Wightman.
Cole, A. D.	Hobbs.	Piggot.	Williams, J. W.
Colin.	Hough.	Riggs.	Wingert.
Day.	Kastle.	Roberts, D. E.	Winslow.
Dohme.	Mason.	Schaeffer, E. M.	Woods.
Duggan.			

Mineralogy, Etc. Dr. Williams. (37 Students).

Mineralogy: (*Advanced*). Lectures three times weekly, Wednesday, Thursday, and Friday, 12 m. Practical work, Saturday, 9–12 a. m. (16).

Aber.	Canfield.	Hobbs.	Mindeleff.
Bell.	Clark.	Hayes.	Orndorff.
Brackett, R. N.	Coar.	Hedrick.	Palmer, C. S.
Caldwell.	Emerson, W. H.	Lewis.	Stein.

Mineralogy: (*Elementary*). Twice weekly, Thursday and Friday, 9 a. m. (21).

Applegarth, E.C.	Hough.	Penniman.	Wightman.
Blandin.	Mason.	Perkins, W. H.	Williams, J. W.
Buckler.	McIntosh.	Smith.	Wingert.
Dohme.	McLane, A.	Stokes.	Winslow.
Friedenwald.	Mount.	Swartz.	Woods.
Hitchcock.			

Biology. (35 Students).

Classes meet in the Biological Laboratory.

General Biology: Professor Martin. Three times weekly, Monday, Tuesday, and Thursday, 11 a. m. (17).

Aber.	Herrick.	McIntosh.	Winslow.
Buckler.	Jefferson.	Schaeffer, E. M.	Wallis.
Hartogensis.	Kastle	Smith.	Wightman.
Haynes.	McGoldrick.	Stein.	Williams.
Hemmeter.			

Animal Physiology and Histology: Professor Martin. Three times weekly, Monday, Wednesday, and Friday, 10 a. m. (10).

Aber.	Haldeman,	Herrick.	Nelson.
Campbell.	Hanna.	Mansfield.	Wiesenfeld.
Edmond.	Hemmeter.		

Advanced Morphology: Dr. Brooks. Three times weekly, Monday, Wednesday, and Friday, 9 a. m. (9).

Andrews.	Howell.	McClintock.	Nachtrieb.
Bruce.	Lee.	McMurrich.	Nelson.
Herrick.			

General Zoology: Dr. Brooks. Twice weekly, Wednesday and Friday, 10 a. m. (8).

Aber.	Edmond.	Hemmeter.	Stein.
Campbell.	Haldeman.	Herrick.	Wiesenfeld.

Osteology: Mr. McMurrich. Twice weekly, Wednesday and Friday, 11 a. m. (11).

Buckler.	Jefferson.	Smith.	Williams, J. W.
Hartogensis.	Kastle.	Stein.	Winslow.
Hemmeter.	McIntosh.	Wightman.	

Laboratory Work: Professor Martin, Dr. Brooks, Dr. Howell. Daily, 9 a. m. to 5 p. m. (31).

Aber.	Haldeman.	Kemp.	Stein.
Andrews.	Hanna.	Lee.	Sternberg.
Bruce.	Hartogensis.	McClintock.	Wallis.
Buckler.	Haynes.	McGoldrick.	Wiesenfeld.
Campbell.	Hemmeter.	McIntosh.	Wightman.
Donaldson.	Herrick.	Nachtrieb.	Williams, J. W.
Duggan.	Jefferson.	Nelson.	Winslow.
Edmond.	Kastle.	Smith.	

Greek. (38 Students).

Classes meet in 181 N. Howard Street, unless otherwise specified.

Seminary: Professor Gildersleeve. Twice weekly, Monday and Wednesday, 12 m. (18).

Arnolt.	Glenn, W. L.	Lowry.	Slaughter.
Botsford.	Graves.	Miller, C. W. E.	Walz.
Christie.	Huizinga.	Pease.	Whicher.
Doubleday.	Hussey.	Scudder.	Zweizig.
Fossum.	Lodge.		

History of Greek Oratory: Professor Gildersleeve. Weekly, Thursday, 12 m. (19).

Arnolt.	Glenn, W. L.	Lowry.	Slaughter.
Botsford.	Graves.	Miller, C. W. E.	Walz.
Christie.	Huizinga.	Milroy.	Whicher.
Doubleday.	Hussey.	Pease.	Zweizig.
Fossum.	Lodge.	Scudder.	

Lyric Poetry: Professor Gildersleeve. Weekly, Tuesday, 10 a. m. (17).

Arnolt.	Glenn, W. L.	Lodge.	Scudder.
Botsford.	Graves.	Miller, C. W. E.	Slaughter.
Christie.	Huizinga.	Milroy.	Walz.
Doubleday.	Hussey.	Pease.	Whicher.
Fossum.			

Greek Syntax: (*Moods and Tenses*): Professor Gildersleeve. Weekly, Friday, 10 a. m. (20).

Arnolt.	Glenn, W. L.	Lowry.	Scudder.
Botsford.	Graves.	Miller, C. W. E.	Slaughter.
Christie.	Huizinga.	Milroy.	Walz.
Doubleday.	Hussey.	Newton.	Whicher.
Fossum.	Lodge.	Pease.	Zweizig.

Conferences in Greek Grammar: (*Undergraduate*): Professor Gildersleeve. Weekly, Tuesday, 12 m. (8).

Gardner, W.	Hodges.	Hough.	Loane.
Hussey.	Horner.	Hughes.	McLane, A.

Aeschylus: *Persae;* ***Euripides:*** *Iphigenia Tauris:* Professor C. D. Morris. Three times weekly, Wednesday, Thursday, Friday, 12 m. (8).

Gardner, W.	Hodges.	Hough.	Lowry.
Harry.	Horner.	Hughes.	McLane, A.

Homer: *Iliad XVI–XVII;* ***Euripides:*** *Hercules Furens:* Dr. Spieker. Four times weekly, Tuesday, Wednesday, Thursday, Friday, 11 a. m. (9).

Bruyn.	Hoffmann.	Kaessmann.	Rogers.
Cole, W. R.	Jackson.	McLane, R. M.	Thompson.
Flexner.			

Prose Composition:

Class A: Professor C. D. Morris. Weekly, Monday, 12 m. (7).

Gardner, W.	Hodges.	Hough.	McLane, A.
Harry.	Horner.	Hughes.	

Class B: Dr. Spieker. Weekly, Monday, 11 a. m. (9).

Bruyn.	Hoffmann.	Kaessmann.	Rogers.
Cole, W. R.	Jackson.	McLane, R. M.	Thompson.
Flexner.			

New Testament Greek: (*Gospel of Mark*): Mr. Harris. Five hours weekly, Monday, 10–11 a. m., Wednesday and Friday, 9–11 a. m., 187 N. Howard St. (3).

Lowry.	Newton.	Rogers.

Sub-Apostolic Literature: Mr. Harris. Three hours weekly, Tuesday, 10–11 a. m., Thursday, 10 a. m.–12 m. 187 N. Howard St. (3).

Lowry.	Newton.	Rogers.

Classical Archæology: Dr. A. Emerson. Weekly, Monday, 3 p. m. (6).

Christie.	Fossum.	Scudder.	Whicher.
Doubleday.	Hussey.		

Attic Judicial System: Dr. A. Emerson. Weekly, Monday, 10 a. m. (10).

Botsford.	Graves.	Lodge.	Slaughter.
Doubleday.	Glenn.	Pease.	Whicher.
Fossum.	Hussey.		

History of Ancient Art: Dr. A. Emerson. Twice weekly, Tuesday and Friday, 9 a. m. (6).

Harry.	Horner.	Loane.	Roberts, B. T.
Hodges.	Hughes.		

Latin. (56 Students).

Classes meet in 181 N. Howard St.

Seminary: *Horace, Juvenal, and Persius:* Dr. Warren. Twice weekly, Tuesday and Friday, 11 a. m. (17).

Botsford.	Gardner, W.	Lodge.	Slaughter.
Bowen.	Glenn, W. L.	Milroy.	Walz.
Bugg.	Graves.	Pease.	Whicher.
Fontaine.	Hussey.	Scudder.	Zweizig.
Fossum.			

Latin Practical Exercises: Dr. Warren. Weekly, Thursday, 11 a. m. (14).

Botsford.	Fossum.	Milroy.	Slaughter.
Bowen.	Gardner, W.	Pease.	Walz.
Bugg.	Graves.	Scudder.	Whicher.
Fontaine.	Lodge.		

Tacitus: Dr. Warren. Three times weekly, Tuesday, Thursday, and Friday, 10 a. m. (7).

Brune.	Guggenheimer.	Jones, W. A.	Young.
Fifield.	Hodges.	Tuska.	

Latin: *Reading at Sight:* Dr. Warren. Weekly, Wednesday, 10 a. m. (8).

Brune.	Guggenheimer.	Jones, W. A.	Tuska.
Fifield.	Hodges.	Pleasants, R. H.	Young.

Catullus and Martial: *Select Poems:* Professor C. D. Morris. Four times weekly, Tuesday, Wednesday, Thursday, Friday, 10 a. m. (6).

English.	Hough.	Jackson.	Roberts, B. T.
Harry.	Hughes.		

Horace: *Select Odes, Satires, and Epistles:* Dr. Spieker. Four times weekly, Tuesday, Wednesday, Thursday, and Friday, 9 a. m. (12).

Bruyn.	Flexner.	McLane, R. M.	Rogers.
Cole, W. R.	Hoffmann.	McPherson.	Thompson.
Dreyer.	Kaessmann.	Preston.	Trower.

Prose Composition:

Class A: Professor C. D. Morris. Weekly, Monday, 10 a. m. (7).

English.	Hodges.	Hughes.	Roberts, B. T.
Harry.	Hough.	Jackson.	

Class B: Dr. Spieker. Weekly, Monday, 9 a. m. (12).

Bruyn, C.	Flexner.	McLane, R. M.	Rogers.
Cole, W. R.	Hoffmann.	McPherson.	Thompson.
Dreyer.	Kaessmann.	Preston.	Trower.

Supplementary Class: Mr. Slaughter. Three times weekly, Monday, Wednesday, and Friday 2 p. m. (13).

Duffy.	Jones, W.	O'Donovan.	Weech.
Friedenwald.	Laessig.	Rouse.	White, J.
Gilpin.	Mount.	Rowland.	Wiegand.
Hahn.			

Shemitic Languages. Professor Haupt. (9 Students).

Classes meet in 113 W. Monument St.

Elementary Hebrew: (*Gesenius' Grammar; Genesis, ed. Baer*). Weekly, Tuesday, 3 p. m. (4).

Adler.	Huizinga.	Rogers.	Schloegel.

Hebrew Exercises: (*Reading at sight of the historical books*). Weekly, Wednesday, 10 a. m. (5).

Adler.	Frothingham.	Huizinga.	Schloegel.
Arnolt.			

Psalms: (*Critical interpretation of the songs of degrees*). Weekly, Tuesday, 4 p. m. (8).

Adler.	Frothingham.	Huizinga.	Rogers.
Arnolt.	Harris.	Philipson.	Schloegel.

Biblical Aramaean: *Interpretation of the Chaldee portions of the book of Daniel.* (*Libri Danielis, Ezrae et Nehemiae, ed. Baer*). Weekly, Wednesday, 11 a. m. (6).

Adler.	Frothingham.	Huizinga.	Schloegel.
Arnolt.	Harris.		

Ethiopic: *Interpretation of the book of Baruch.* (*Dillmann's Chrestomathy*). Twice weekly, Wednesday and Thursday, 4 p. m. (6).

Adler.	Frothingham.	O'Conor.	Philipson.
Arnolt.	Huizinga.		

Arabic: *Extracts from the Travels of Ibn Batûtah* (*Beyrut Chrestomathy*). Weekly, Wednesday, 3 p. m. (5).

Adler.	Frothingham.	Huizinga.	Philipson.
Arnolt.			

Grammatical Cuneiform Texts: (*Haupt's Keilschrifttexte*). Weekly, Thursday, 10 a. m. (6).

Adler.	Frothingham.	O'Conor.	Philipson.
Arnolt.	Huizinga.		

Sumero-Akkadian: *Select bilingual Hymns and Psalms.* (*Haupt's Keilschrifttexte.*) Weekly, Thursday, 11 a. m. (6).

Adler.	Frothingham.	O'Conor.	Philipson.
Arnolt.	Huizinga.		

Assyrian: *Sardanapalus' Arabian Campaign* (*Sir Henry Rawlinson's Cuneiform Inscriptions of Western Asia, Vol. V, pl. 7, seq.*) Weekly, Thursday, 3 p. m. (6).

Adler.	Frothingham.	O'Conor.	Philipson.
Arnolt.	Huizinga.		

Sanskrit and the comparative grammar of the cognate languages. Dr. Bloomfield. (21 Students).

Classes meet in 113 W. Monument Street, unless otherwise specified.

Elementary Sanskrit: (*Whitney's Grammar and Lanman's Reader*). Twice weekly, Monday, 11 a. m., Friday, 12 m. (12).

Botsford.	Doubleday.	Lodge.	Walz.
Christie.	Folsom.	Milroy.	Whicher.
Cobb.	Hussey.	Scudder.	Wilcox.

Advanced Sanskrit: (*Kathāsaritsāgara*). Weekly, Thursday, 10 a. m. (2).

Cobb.	Wilcox.

Vedic Sanskrit: (*Selections from the Brāhmana and Sūtra Literature*). Weekly, Saturday, 11 a. m. (4).

Cobb.	Spieker.	Todd.	Wilcox.

Comparative Philology: (*Lectures and Whitney's "Language, and the Study of Language."*) Weekly, Wednesday, 4 p. m., Bentley Hall. (11).

Christie.	Dunlap.	Hubbard.	Reeves.
Cobb.	Hempl.	Lerch.	Walz.
Doubleday.	Horner.	Milroy.	

Comparative Grammar of Greek Vowels: (*Lectures*). Weekly, Monday, 4 p. m., Bentley Hall. (8).

Botsford.	Doubleday.	Scudder.	Wilcox.
Christie.	Hussey.	Slaughter.	Whicher.

German. (87 Students).

Classes meet in 111 and 117 W. Monument St.

Old High German: (*Braune's Reader*): Dr. Wood. Twice weekly, Monday and Thursday, 9 a. m. (7).

Cobb.	Hempl.	Lerch.	Wright.
Egge.	Learned.	Matzke.	

Middle High German: (*Hartmann's Iwein*): Dr. Wood. Weekly, Thursday, 12 m. (6).

Burton.	Hempl.	Lerch.	Matzke.
Cobb.	Learned.		

German Comparative Grammar: (*Lectures*): Dr. Wood. Weekly, Wednesday, 12 m. (12).

Burton.	Egge.	Hubbard.	Matzke.
Cobb.	Gates.	Learned.	Naeseth.
Dunlap.	Hempl.	Lerch.	Wright.

(*Major Course*).

German Literature: (*Lectures, with Kluge's Geschichte d. Deutschen Literatur*). Dr. Wood. Weekly, Friday, 10 a. m. (18).

Burton.	Gorton.	Learned.	McDaniel.
Dunlap.	Hartogensis.	Lerch.	Naeseth.
Egge.	Hempl.	Loane.	Schaefer, J.
Eichelberger.	Hubbard.	Matzke.	Wright.
Flexner.	Laessig.		

Goethe: *Faust, I:* Mr. Hempl. Twice weekly, Monday and Thursday, 10 a. m. (18).

Claxton.	Flexner.	Hubbard.	McDaniel.
Doub.	Gardner, W.	Laessig.	Scudder.
Dunlap.	Gates.	Lambert.	Schaefer.
Eichelberger.	Gorton.	Loane.	Young.
Fifield.	Hartogensis.		

Selected Readings: (*Masius's Lesebuch, iii*): Dr. Wood. Weekly, Tuesday, 10 a. m. (11).

Burton.	Eichelberger.	Hartogensis.	McDaniel.
Cobb.	Flexner.	Howard.	Schaefer, J.
Dunlap.	Gorton.	Laessig.	

(The selections are made from Historical, Scientific, and Miscellaneous Prose).

Prose Composition: Dr. Wood. Weekly, Wednesday, 10 a. m. (8).

Eichelberger.	Gates.	Howard.	McDaniel.
Flexner.	Gorton.	Laessig.	Schaefer, J.

Exercises in German Style; Dr. Wood. Second Monday of each month, 4 p. m. (7).

Eichelberger.	Gorton.	Loane.	Schaefer, J.
Flexner.	Laessig.	McDaniel.	

(*Minor Course*):

Lessing: *Prosa:* Mr. Hempl. Twice weekly, Monday and Wednesday, 11 a. m. (12).

Beckwith.	Claxton.	Fareckson.	Roberts, D. E.
Bevan.	Crosby.	Harry.	Trower.
Birney.	Dunlap.	Penniman.	Tuska.

Goethe: *Prosa:* Mr. Hempl. Twice weekly, Monday and Wednesday, 3 p. m. (9).

Beckwith.	Coates.	Gordon, D. H.	Weech.
Bromwell.	Duffy.	Reese.	Willis.
Claxton.			

Selected Readings: (*Oltrogge's Lesebuch, ii*): Dr. Wood and Mr. Hempl. (*Two Sections*). Weekly, Friday, 11 a. m. (21).

Beckwith.	Crosby.	Harry.	Roberts, D. E.
Bevan.	Duffy.	Lewis.	Trower.
Birney.	Dunlap.	McLane, A.	Tuska.
Bromwell.	Eareckson.	Penniman.	Weech.
Coates.	Gordon, D. H.	Reese.	Willis.
Claxton.			

(The selections are made from Historical, Scientific, and Miscellaneous Prose).

Oral Practice; Dr. Wood. Weekly, Tuesday, 11 a. m. (20).

Beckwith.	Coates.	Harry.	Roberts, D. E.
Bevan.	Crosby.	Lewis.	Trower.
Birney.	Duffy.	McLane, A.	Tuska.
Bromwell.	Eareckson.	Penniman.	Weech.
Claxton.	Gordon, D. H.	Reese.	Willis.

Prose Composition: Mr. Hempl. Weekly, Thursday, 11 a. m. (20).

Beckwith.	Crosby.	Hubbard.	Straus.
Bevan.	Duffy.	Penniman.	Trower.
Birney.	Eareckson.	Reese.	Tuska.
Bromwell.	Gordon, D. H.	Roberts, D. E.	Weech.
Coates.	Harry.	Stow.	Willis.

German Conversation: Dr. Gerber. Daily, Monday, 1 p. m.; Tuesday and Friday, 12 m.; Wednesday and Thursday, 9 a. m. (19).

Doub.	Hartogensis.	Lewis.	Scudder.
Fontaine.	Haynes.	Lodge.	Stokes.
Gardner, H. B.	Howard.	Loane.	Tuska.
Gardner, W.	Hubbard.	McDaniel.	Whicher.
Gorton.	Learned.	Perkins, C. A.	

Supplementary Classes:

Section I: Brandt's Grammar, Deutsch's Reader: MR. HEMPL. Three times weekly, Monday, Tuesday, and Thursday, 4 p. m. (8).

Emerson, W. H.	Lowry.	Perkins, C. A.	Wightman.
Fields.	Mount.	Taylor, W. D.	Van Vleck.

Section II: Ludwig, Schloss Heimburg: MR. HEMPL. Five times fortnightly, Tuesday, Thursday and alternate Fridays, 3 p. m. (23).

Carter.	Gross.	Lowndes.	Rouse.
Dashiell.	Hahn.	Meriwether.	Rowland.
Dorsey.	Hodges.	O'Donovan.	Shemwell.
Ensey.	Hughes.	Ota.	Straus.
Ferguson.	Jones, W. A.	Preston.	White, J.
Ferris.	Lamb.	Reeves.	

Romance Languages. (49 Students).

Classes meet in 111 and 117 W. Monument St.

Advanced Courses: (*Old French Seminary; Romance Languages in Europe; Langue d'oïl Dialects; Comparative Phonology of the Romance Languages, Wallachian*): MR. ELLIOTT. (5 classes). Monday, 10 a. m. to 12 m.; Tuesday, 12 m.; Wednesday, 9 a. m. to 12 m. (4).

Bowen.	Fontaine.	Perkins, C. A.	Todd.

Advanced Courses: (*Catalan: Portuguese: Old Provençal*): DR. TODD. (3 classes). Wednesday, Thursday, and Friday, 1 p. m. (4).

Bevan.	Bugg.	Learned.	Perkins, C. A.

Italian: (*Manzoni, Dante*): DR. TODD. Three times weekly, Monday, 1 p. m., Tuesday and Wednesday, 9 a. m. (6).

Bevan.	Egge.	Howard.	Matzke.
Bugg.	Fossum.		

Spanish: (*Knapp's Spanish Readings*): DR. TODD. Twice weekly, Thursday and Friday, 9 a. m. (4).

Bevan.	Bugg.	Claxton.	Matzke.

French: Major Course: (*Aucassin et Nicolête; French Phonology*): MR. ELLIOTT. Monday, 12 m., Tuesday, 1 p. m. (7).

Bevan.	Learned.	Perkins, C. A.	Veneziani.
Bugg.	Matzke.	Reeves.	

French: Major Course: (*Chanson de Roland*): DR. TODD. Tuesday and Friday, 10 a. m. (4).

Bugg.	Learned.	Matzke.	Perkins, C. A.

French: Minor Course: DR. TODD (*Beaumarchais*), Tuesday and Wednesday, 12 m.;—MR. BOWEN (*Memoirs*, XVII *Cent.; Milne-Edwards*), Thursday and Friday, 12 m.;—MR. FONTAINE (*Composition*), Monday, 12 m. (8).

Ames.	Buckler.	Lowndes.	Reeves.
Beckwith.	English.	Pleasants, R. H.	Winslow.

French Conversation: MR. FONTAINE. Four times weekly, Monday, Thursday, Friday, 3 p. m., and Saturday, 9 a. m. (19).

Ames.	Dreyer.	Howard.	Reeves.
Barcroft.	English.	Hubbard.	Ryttenberg.
Beckwith.	Fifield.	Learned.	Steiner.
Birney.	Guggenheimer.	Lowndes.	Winslow.
Bugg.	Hartogensis.	Matzke.	

Supplementary Class: MR. BOWEN. Five times fortnightly, Monday, Wednesday, and Friday, 3 p. m. (19).

Bayard.	Ensey.	Lamb.	Straus.
Brack.	Ferguson.	Mount.	Taylor, W. D.
Dorsey.	Hobbs.	Preston.	Tuska.
Doub.	Hodges.	Rowland.	Young.
Eareckson.	Hughes.	Stevens.	

The advanced students of the Romance Languages meet as an association fortnightly, Monday, 8 p. m. (9).

Bevan.	Fontaine.	Matzke.	Reeves.
Bowen.	Learned.	Perkins, C. A.	Veneziani.
Bugg.			

English and Anglo-Saxon. (66 Students).

Classes meet in 111 and 117 W. Monument St.

Anglo-Saxon: *Béowulf:* DR. WOOD. Weekly, Wednesday, 9 a. m. (9).

Burton.	Gates.	Learned.	Matzke.
Cobb.	Hempl.	Lerch.	Naeseth.
Dunlap.			

English Literature of the Fourteenth Century: *Chaucer, Langland, Wyclif, etc:* (*Minor Course*): DR. BROWNE. Twice weekly, Tuesday and Friday, 11 a. m. (9).

Applegarth, A. C.	Cobb.	Marks.	Reeves.
Brackett, J. R.	Hughes.	Noyes.	Wood, J.
Burton.			

Anglo-Saxon: (*Sweet's Reader: Elene, ed. Zupitza*): MR. WRIGHT. Twice weekly, Tuesday and Friday, 4 p. m. (6).

Claxton.	Hubbard.	Matzke.	Naeseth.
Fossum.	Learned.		

Early English: MR. EGGE. Twice weekly, Tuesday, 9 a. m., and Friday, 12 m. (6).

Burton.	Dunlap.	Hubbard.	Naeseth.
Claxton.	Gates.		

English Literature: (*P. H. E. Course*): Continuation of the synoptical view of English Literature: DR. BROWNE. Twice weekly, Wednesday and Thursday, 12 m. (49).

Applegarth, E. C.	Eareckson.	Laessig.	Schaefer, J.
Birney.	Ferguson.	Loane.	Shemwell.
Brack.	Fifield.	McLane, R. M.	Stow.
Bromwell.	Flexner.	McPherson.	Straus.
Brune.	Friedenwald.	Marks.	Thompson.
Carter.	Gilpin.	O'Donovan.	Trower.
Coates.	Gordon, D. H.	Preston.	Tuska.
Cole, W. R.	Guggenheimer.	Reese.	Weech.
Crosby.	Hoffmann.	Roberts, B. T.	White, E. L.
Dashiell.	Jackson.	Rogers.	White, J.
Dorsey.	Jones, W. A.	Rouse.	Williams, J. W.
Dreyer.	Kaessmann.	Rowland.	Willis.
Duffy.			

History and Political Science. (100 Students).

Classes meet in the rooms of the Bluntschli Library.

Seminary of History and Politics: DR. ADAMS. Weekly, Friday, 8 p. m. (24).

Applegarth, A. C.	Fossum.	Lichty.	Sato.
Berry.	Gardner, H. B.	McMahon.	Scaife.
Bonsal.	Gould.	Morris, C. N.	Steiguer.
Brackett, J. R.	Holcomb.	Newton.	Wilson, W.
Coler.	Howard.	Ota.	Wood, J.
Dewey.	Levermore.	Randall.	Worthington.

History of Politics: DR. ADAMS. Three times weekly, Monday, Wednesday, and Thursday, 10 a. m. (23).

Applegarth, A. C.	Holcomb.	Morris, C. N.	Steiguer.
Berry.	Howard.	Newton.	Wilson, W.
Brackett, J. R.	Levermore.	Ota.	Wood, J.
Dewey.	Lichty.	Randall.	Woodward.
Fossum.	McMahon.	Sato.	Worthington.
Gardner, H. B.	Miller, E. G.	Scaife.	

The Renaissance: DR. ADAMS. Twice weekly, Monday and Tuesday, 11 a. m. (18).

Brack.	Lerch.	Pleasants, J.	Williams, L.
Coler.	Lowry.	Pleasants, R. H.	Williams, W. K.
Doub.	McMahon.	Price.	Wood, J.
Egge.	Newton.	Schaefer, J.	Woods.
Gardner, H. B.	Ota.		

International Law: DR. ADAMS. Twice weekly, Monday and Tuesday, 12 m. (6).

Applegarth, A. C.	Howard.	Ryttenberg.	Steiner.
Claxton.	Price.		

Finance and Administration: DR. ELY. Three times weekly, Wednesday, Thursday, and Friday, 12 m. (19).

Applegarth, A. C.	Howard.	Morris, C. N.	Swift.
Berry.	Levermore.	Ota.	Wilson, W.
Dewey.	Lichty.	Randall.	Wood, J.
Gardner, H. B.	McMahon.	Sato.	Worthington.
Holcomb.	Miller, E. G.	Scaife.	

History of Political Economy: DR. ELY. Daily, 1 p. m. (28).

Bayard.	Gardner, H. B.	Ota.	Swift.
Brune.	Glenn, J.	Pleasants, J.	Wiesenfeld.
Coates.	Guggenheimer.	Pleasants, R. H.	Williams, L.
Doub.	Lichty.	Ryttenberg.	Williams, W. K.
Dunlap.	Loane.	Sams.	Wood, J.
Ferguson.	McMahon.	Steiguer.	Woods.
Fifield.	Meriwether.	Steiner.	Young.

English and French History: DR. JAMESON. Three times weekly, Wednesday, Thursday, and Friday, 11 a. m. (11).

Brack.	Price.	Van Vleck.	Woods.
Doub.	Sams.	Williams, L.	Young.
Glenn, J.	Schaefer, J.	Williams, W. K.	

American Constitutional History: DR. JAMESON. Three times weekly, Monday, Wednesday, and Thursday, 4 p. m. (15).

Applegarth, A. C.	Gates.	Meriwether.	Ryttenberg.
Claxton.	Howard.	Miller, E. G.	Steiner.
Dunlap.	Lichty.	Morris, C. N.	Wood, J.
Gardner, H. B.	McMahon.	Price.	

Roman History: (*P. H. E. Course*): DR. JAMESON. Twice weekly, Monday and Tuesday, 12 m. (44).

Applegarth, E.C.	Eareckson.	Laessig.	Schaefer, J.
Birney.	Ferguson.	Lamb.	Shemwell.
Brack.	Fifield.	McLane, R. M.	Stow.
Bromwell.	Friedenwald.	McPherson.	Straus.
Brune.	Gilpin.	O'Donovan.	Thompson.
Carter.	Gordon, D. H.	Preston.	Trower.
Cole, W. R.	Guggenheimer.	Reese.	Weech.
Crosby.	Hoffmann.	Roberts, B. T.	White, E. L.
Dorsey.	Jackson.	Rogers.	White, J.
Dreyer.	Jones, W. A.	Rouse.	Williams, J. W.
Duffy.	Kaessmann.	Rowland.	Willis.

Relations of Physical Geography to History: (*P. H. E. Course*): DR. JAMESON. Weekly, Friday, 12 m. (51).

Applegarth, E. C.	Duffy.	Kaessmann.	Shemwell.
Armiger.	Eareckson.	Laessig.	Stow.
Birney.	Ferguson.	Lamb.	Straus.
Brack.	Fifield.	McLane.	Thompson.
Bromwell.	Flexner.	McPherson.	Trower.
Brune.	Friedenwald.	O'Donovan.	Tuska.
Carter.	Gilpin.	Preston.	Weech.
Coates.	Gordon, D. H.	Reese.	White, E. L.
Cole, W. R.	Guggenheimer.	Roberts, B. T.	White, J.
Crosby.	Hoffmann.	Rogers.	Williams, J. W.
Dashiell.	Hughes.	Rouse.	Willis.
Dorsey.	Jackson.	Rowland.	Young.
Dreyer.	Jones, W, A.	Schaefer, J.	

Psychology and Pedagogics. PROFESSOR HALL. (37 Students).

Psychology. Twice weekly, Monday and Tuesday, 12 m., Biological Laboratory. (21).

Andrews.	Gross.	Lee.	Newton.
Bruce.	Hanna.	Lichty.	Noyes.
Burton.	Hemmeter.	McClintock.	Scaife.
Campbell.	Jastrow.	McCulloch.	Steiguer.
Cohn.	Kemp.	Nelson.	Swift.
Edmond.			

Educational Course. Weekly, Thursday, 9 a. m., 106 W. Monument Street. (26).

Adler.	Gross.	McMahon.	Sato.
Andrews.	Holcomb.	Meriwether.	Scaife.
Applegarth, A.C.	Hussey.	Morris, C. N.	Swift.
Berry.	Jastrow.	Nelson.	Wilson, W.
Dewey.	Lee.	Newton.	Woodward.
Edmond.	Levermore.	Noyes.	Worthington.
Egge.	McCulloch.		

Educational Lectures. On successive Saturdays, at 10 a. m., in Hopkins Hall. This course, by various members of the Academic Staff, is designed for the Fellows and Graduate Students looking forward to scientific and educational careers.

Physical Training. DR. HARTWELL.

All undergraduate students are required to follow the courses of physical training as advised by Dr. Hartwell, the Director of the Gymnasium.

Elocution. (51 Students).

MR. WOODWORTH. Daily, 9 a. m. to 2 p. m.

Applegarth, A.C.	Ferguson.	Lamb.	Steiguer.
Applegarth, E.C.	Friedenwald.	Lodge.	Stein.
Bayard.	Gorton.	Lowry.	Steiner.
Birney.	Guggenheimer.	McCulloch.	Straus.
Coates.	Hartogensis.	McDaniel.	Trower.
Cole, W. R.	Hobbs.	McIntosh.	Tuska.
Coler.	Horner.	Reeves.	Veneziani.
Dohme.	Hough.	Roberts, D. E.	Wiesenfeld.
Dorsey.	Hughes.	Rogers.	Willis.
Duffy.	Hussey.	Rittenberg.	Wingert.
Eareckson.	Jackson.	Schaefer, J.	Winslow.
Eichelberger.	Kaessmann.	Slack.	Woods, J.
Emerson, W. H.	Laessig.	Smith.	

Drawing. (46 Students).

MR. NEWELL. Daily (except Wednesday and including Saturday) 1 to 5 p. m.

(*Free-Hand Drawing.*)

Ames.	Dreyer.	Herrick.	Shemwell.
Andrews.	Eareckson.	Horner.	Smith.
Applegarth, E.C.	Emerson, A.	Jones, W. A.	Stein.
Armiger.	Ensey.	Lowndes.	Stow.
Bell.	Fifield.	Noyes.	Straus.
Birney.	Gilpin.	O'Donovan.	Thompson.
Campbell.	Gordon.	Price.	Trower.
Coates.	Guggenheimer.	Randall.	Willis.
Dashiell.	Haldeman.	Reese.	Winslow.
Doub.	Hartogensis.	Roberts, B. T.	Williams, J. W.

(*Beginning Mechanical Drawing.*)

Ames.	Ensey.	Laessig.	Roberts, D. E.
English.			

(*Advanced Mechanical Drawing.*)

Eichelberger.	Gorton.	McDaniel.

FELLOWS BY COURTESY, 1884-85.

The persons below named have been designated by the Academic Council as Fellows by Courtesy for the current academic year:

GUSTAV BISSING, A. B., Johns Hopkins University.
JAMES W. BRIGHT, PH. D., Johns Hopkins University.
HENRY H. DONALDSON, A. B., Yale College.
JAMES R. DUGGAN, PH. D., Johns Hopkins University.
LOUIS DUNCAN, U. S. Naval Academy.
ADOLPH GERBER, PH. D., University of Munich.
ELGIN R. L. GOULD, A. B., Victoria University.
ARTHUR S. HATHAWAY, B. S., Cornell University.
H. CARVILL LEWIS, A. M., University of Pennsylvania.
ROBERT W. PRENTISS, B. S., Rutgers College.
SHOSUKI SATO, B. S., Sapporo Agricultural College, Japan.
GEORGE M. STERNBERG, Surgeon, U. S. A., M. D., College of Phys. & Surg. (N. Y.).
MORRISON I. SWIFT, A. B., Williams College.
ALEXANDER M. WILCOX, PH. D., Yale College.
LEWIS W. WILHELM, PH. D., Johns Hopkins University.

JOHN C. FIELDS, A. B., University of Toronto, 1884, has been appointed a *Fellow in Mathematics* by the Board of Trustees, on the recommendation of the Academic Council.

ADDITIONS TO THE ROLL OF STUDENTS.

(See pp. 8–11 of *University Circular* No. 34).

GRADUATE STUDENTS.

JOHN W. CALDWELL. New Orleans, La. 8 *McCulloh St.*
A. B., Charleston College, 1861, and A. M., 1868; M. D., Virginia Medical College, 1864. *Chemistry, etc.*

WILLIAM A. HEDRICK. Georgetown, D. C. 110 *N. Carey St.*
A. M., Columbian University, 1884. *Chemistry.*

WILLIAM M. MILROY. Northwood, Ohio. 98 *McCulloh St.*
A. B., Geneva College (Pa.), 1877; B. D., Yale College, 1882. *Latin.*

WILLIAM N. MUMPER. Dillsburg, Pa. 247 *Linden Av.*
A. B., Dickinson College, 1879. *Physics and Chemistry.*

CHRISTEN A. NAESETH. Decorah, Iowa. 8 *McCulloh St.*
A. B., Norwegian Luther College, 1874, and A. M., 1883. *English.*

ROBERT B. RIGGS. Oahe, Dakota. 118 *W. Biddle St.*
A. B., Beloit College, 1876; Ph. D., University of Göttingen, 1883. *Chemistry.*

SPECIAL STUDENTS.

JOHN D. ARMIGER. Huntingtown. 47 *Lee St.*
Charlotte Hall School. *Physics.*

CORNELIUS BRUYN. Kingston, N. Y. 333 *N. Eutaw St.*
Rutgers College. *Greek and Latin.*

F. LOUIS GRAMMER. Baltimore. 289 *McCulloh St.*
Lehigh University. *Chemistry.*

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HOURS FOR LECTURES AND RECITATIONS, SECOND HALF-YEAR, 1884-85.

HOURS.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
A. M. 9	General Chemistry. (Morse.) Carbon Compounds. (Remsen.) Latin Prose. (Spieker.) Animal Morphology. (Brooks.) Old High German. (Wood.) Elocution. (Woodworth.)	General Chemistry. (Morse.) Carbon Compounds. (Remsen.) Horace. (Spieker.) Analyt. Mechanics. (Newcomb.) Italian. (Todd.) Hist. of Anc. Art. (Emerson.) Early English. (Egge.) Elocution. (Woodworth.)	General Chemistry. (Morse.) Carbon Compounds. (Remsen.) Horace. (Spieker.) Italian. (Todd.) Animal Morphology. (Brooks.) Romance Lang.: Adv. (Elliott.) New Test. Greek. (Harris.) Anglo-Saxon: Beowulf. (Wood.) German Conversation. (Gerber.) Elocution. (Woodworth.)	Mineralogy: Elem. (Williams.) Carbon Compounds. (Remsen.) Horace. (Spieker.) Analyt. Mechanics. (Newcomb.) Spanish. (Todd.) Pedagogics. (Hall.) Old High German. (Wood.) German Conversation. (Gerber.) Elocution. (Woodworth.)	Mineralogy: Elem.(Williams.) Carbon Compounds. (Remsen.) Horace. (Spieker.) Spanish. (Todd.) Animal Morphology. (Brooks.) Hist. of Anc. Art. (Emerson.) New Test. Greek. (Harris.) Elocution. (Woodworth.)	Mineralogy: Adv. (Williams.) French Conversation. (Fontaine.)
10	General Physics. (Kimball.) Physiol. and Histol. (Martin.) Electr. and Magnetism. (Rowland.) German: Major. (Hempl.) History of Politics. (Adams.) Latin Prose. (Morris.) Romance Lang.: Adv. (Elliott.) New Test. Greek. (Harris.) Attic Judicial System. (Emerson.) Math.: Intr. for Grad. (Story.) Elocution. (Woodworth.)	General Physics. (Kimball.) Electr. and Magnetism. (Rowland.) German: Major. (Wood.) French: Major. (Todd.) Catullus and Martial. (Morris.) Tacitus. (Warren.) Lyric Poetry. (Gildersleeve.) Sub-Apost. Lit. (Harris.) Math.: Intr. for Grad. (Story.) Elocution. (Woodworth.)	General Physics. (Kimball.) Physiol. and Histol. (Martin.) Electr. and Magnetism. (Rowland). German: Major. (Wood.) History of Politics. (Adams.) Catullus and Martial. (Morris.) Latin at sight. (Warren.) Romance Lang.: Adv. (Elliott.) New Test. Greek. (Harris.) General Zoology. (Brooks.) Hebrew Exercises. (Haupt.) Math.: Intr. for Grad. (Story.) Elocution. (Woodworth.)	General Physics. (Kimball.) Electr. and Magnetism. (Rowland.) German: Major. (Hempl.) History of Politics. (Adams.) Catullus and Martial. (Morris.) Tacitus. (Warren.) Sanskrit: Adv. (Bloomfield.) Sub-Apost. Lit. (Harris.) Cuneiform Texts. (Haupt.) Math.: Intr. for Grad. (Story.) Elocution. (Woodworth.)	General Physics. (Kimball.) Physiol. and Histol. (Martin.) Electr. and Magnetism. (Rowland.) German: Major. (Wood.) French: Major. (Todd.) Catullus and Martial. (Morris.) Tacitus. (Warren.) Greek Syntax. (Gildersleeve.) New Test. Greek. (Harris.) General Zoology. (Brooks.) Math.: Intr. for Grad. (Story.) Elocution. (Woodworth).	Educational Lectures. Mineralogy: Adv. (Williams.)
11	General Biology. (Martin.) German: Minor. (Hempl.) Renaissance. (Adams.) Greek Prose. (Spieker.) Sanskrit: Elem. (Bloomfield.) Romance Lang.: Adv. (Elliott.) Linear Diff. Equations. (Craig.) Solid Anal. Geom. (Franklin.) Elocution. (Woodworth.)	General Biology. (Martin.) German: Minor. (Wood.) Renaissance. (Adams.) Latin Seminary. (Warren.) Homer. (Spieker.) Differential Equations. (Craig.) English: Minor. (Browne.) Elocution. (Woodworth.)	Osteology. (McMurrich.) German: Minor. (Hempl.) English & French Hist. (Jameson.) Homer. (Spieker.) Aramaean. (Haupt.) Romance Lang: Adv. (Elliott.) Linear Diff. Equations. (Craig.) Solid Anal. Geom. (Franklin.) Elocution. (Woodworth.)	General Biology. (Martin.) German: Minor. (Hempl.) English & French Hist. (Jameson.) Latin Exercises. (Warren.) Homer. (Spieker.) Sumero-Akkadian. (Haupt.) Differential Equations. (Craig.) Sub-Apost. Lit. (Harris.) Elocution. (Woodworth.)	Osteology. (McMurrich.) German: Minor. (Wood.) English & French Hist. (Jameson.) Latin Seminary. (Warren.) Homer. (Spieker.) Linear Diff. Equations. (Craig.) Solid Anal. Geom. (Franklin.) English: Minor. (Browne.) Elocution. (Woodworth.)	Vedic Sanskrit. (Bloomfield.) Mineralogy: Adv. (Williams.)
M. 12	Greek Seminary. (Gildersleeve.) Psychology. (Hall.) French: Minor. (Fontaine.) Greek Prose. (Morris.) Quaternions. (Story.) International Law. (Adams.) French: Major. (Elliott.) History: P. H. E. (Jameson.) Elocution. (Woodworth.)	Greek Grammar. (Gildersleeve.) Psychology. (Hall.) French: Minor. (Todd.) Modern Algebra. (Story.) International Law. (Adams.) Romance Lang: Adv. (Elliott.) History: P. H. E. (Jameson.) German Conversation. (Gerber.) Problems in Mechanics. (12.30). (Franklin.) Elocution. (Woodworth.)	Greek Seminary. (Gildersleeve.) French: Minor. (Todd.) Aeschylus and Eurip. (Morris.) Quaternions. (Story.) Polit. Econ.: Adv. (Ely.) Mineralogy: Adv. (Williams.) English Lit.: P. H. E. (Browne.) Comp. Gram. of German. (Wood.) Elocution. (Woodworth.)	Greek Oratory. (Gildersleeve.) French: Minor. (Bowen.) Aeschylus and Eurip. (Morris.) Modern Algebra. (Story.) Polit. Econ.: Adv. (Ely.) Mineralogy: Adv. (Williams.) English Lit.: P. H. E. (Browne.) Middle High German. (Wood.) Problems in Mechanics (12.30). (Franklin.) Elocution. (Woodworth.)	French: Minor. (Bowen.) Aeschylus and Eurip. (Morris.) Quaternions. (Story.) Polit. Econ.: Adv. (Ely.) Sanskrit: Elem. (Bloomfield.) Mineralogy: Adv. (Williams.) Phys. Geog.: P. H. E. (Jameson.) German Conversation. (Gerber.) Early English. Egge. Elocution. (Woodworth.)	
P. M. 1	Polit. Econ.: Elem. (Ely.) Italian. (Todd.) Theory of Functions. (Craig.) Calculus. (Franklin.) German Conversation. (Gerber.) Drawing. (Newell.) Elocution. (Woodworth.)	Polit. Econ.: Elem. (Ely.) French: Major. (Elliott.) Conic Sections. (Story.) Drawing. (Newell.) Elocution. (Woodworth.)	Polit. Econ.: Elem. (Ely.) Romance Lang: Adv. (Todd.) Theory of Functions. (Craig.) Calculus. (Franklin.) Elocution. (Woodworth.)	Polit. Econ.: Elem. (Ely.) Romance Lang: Adv. (Todd.) Conic Sections. (Story.) Drawing. (Newell.) Elocution. (Woodworth.)	Polit. Econ.: Elem. (Ely.) Romance Lang.: Adv. (Todd.) Theory of Functions. (Craig.) Calculus. (Franklin.) Drawing. (Newell.) Elocution. (Woodworth.)	Drawing. (Newell.)
2	Drawing. (Newell.) Latin. (Slaughter.)	Drawing. (Newell.)	Latin. (Slaughter.)	Drawing. (Newell.)	Drawing. (Newell.) Latin. (Slaughter.)	Drawing. (Newell.)
3	French Conversation. (Fontaine.) German: Minor. (Hempl.) French: Elem. (Bowen.) Classical Archaeol. (Emerson.) Drawing. (Newell.)	Hebrew: Elem. (Haupt.) German: Elem. (Hempl.) Drawing. (Newell.)	Arabic. (Haupt.) German: Minor. (Hempl.) French: Elem. Bowen.)	Assyrian. (Haupt.) French Conversation. (Fontaine.) German: Elem. (Hempl.) Drawing. (Newell.)	French Conversation. (Fontaine.) German: Elem. (Hempl.) (Alternate Fridays.) French: Elem. (Bowen.) (Alternate Fridays.) Drawing. (Newell.)	Drawing. (Newell.)
4	Comp. Gram. of Greek. (Bloomfield.) German Style. (Wood). (Monthly.) Analytic Geometry. (Franklin.) German: Elem. (Hempl.) Am. Const. Hist. (Jameson.) Drawing. (Newell.) Romance Lang. Society. (8 p. m. fortnightly.) Math. Sem. (Newcomb.) (8 p. m.)	Physics: Major. (Kimball.) Psalms. (Haupt.) Anglo-Saxon. (Wright.) German: Elem. (Hempl.) (Alternate Tuesdays.) Drawing. (Newell.)	Ethiopic. (Haupt.) Comp. Philol. (Bloomfield.) Analytic Geometry. (Franklin.) Am. Const. Hist. (Jameson.)	Physics: Major. (Kimball.) Ethiopic. (Haupt.) German: Elem. (Hempl.) Am. Const. Hist. (Jameson.) Drawing. (Newell.) Math. Sem. (Story.) (8 p. m.)	Math. Seminary. (Craig.) Anglo-Saxon. (Wright.) Analytic Geometry. (Franklin.) Drawing. (Newell.) Hist. Sem. (Adams.) (8 p. m.)	Drawing. (Newell.)

The public lectures begin at 5 p. m.