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THE TECHNIC.

TERMS.

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NOTICE TO SUBSCRIBERS.

Hereafter we shall follow the general rule regarding subscriptions, and shall continue sending THE TECHNIC to subscribers until notified to discontinue.

THE sudden death of S. Gilmore Mead, which occurred in this city on March the fourth, was one of those sad events which take place only seldom during the college lives of men. The cause of his death was appendicitis, his sickness only extending over a period of nine days. Being a member of the graduating class and having merely attained his majority he was just preparing to enter upon a career which no one suspected would end so soon. He possessed a character peculiarly marked by its manliness and courteousness, which secured for him friends on every side. He will be missed by all who knew him and his place at the Institute will not be filled for a long time to come. Wishing to express the deep regard we had for him, we extend to the bereaved family our most sincere sympathy.

THE new catalogue appears this year with a neat and appropriate cover design. The catalogue was received by the students with eagerness, the Freshmen especially being anxious to see if their names were on the student list provided with the proper prefixes and suffixes. Several changes have been made which prove to be very convenient. The outlines for the courses are made more simple to the uninitiated, the different subjects being identified by references made to their respective departments. The "Lectures in Astronomy" still holds forth in its old-time position, but the Seniors and Juniors are on the point of issuing a search warrant for the recovery of this year's lectures. The alphabetical list of the alumni is a valuable addition, and the newly-adopted plan of publishing a list of the theses of the graduating classes, furnishes to persons not acquainted with the workings of the Institute, an idea of the character of work being carried on here.

* * *

THE fact that there was a Sophomore banquet within the past two weeks has become so generally known through the medium of the local papers that little can be said about it in the way of news. However, the different views which various people have concerning the affair are so widely different that one scarcely hears the same story twice. The newspapers seem to agree that the whole affair was a riot, prearranged, with plans and articles drawn up between the Freshman and Sophomore classes, to fight each other to the death.

Mine Host Baur, of the Terre Haute House, whose guests the Sophomores were for the evening, evidently thought his house was being attacked by a mob and asked a policeman standing near to arrest the "rowdies." Although the one seized upon was one of his own guests, Mr. Baur being no respector of guests, would not give the

word which was only necessary to secure his release.

The Sophomores no doubt considered this action as a lack of respect to their class, and set out at once to find a more congenial host.

The guardian of peace considered it all as a huge joke and enjoyed the fun immensely until called upon to act by Mr. Baur. The local papers then suggest that gold medals be given to both.

Rose men knowing perfectly the friendly spirit existing in affairs of this kind, do not look at matters in the light that some people have allowed themselves to do. It is difficult to understand why an occasional manifestation of college spirit should be looked upon by persons of the present age as lawless and riotous. Let us look at things as they are and not be misled by untrue and prejudiced reports.

* * *

THE attitude taken by the local newspapers in regard to the recent Sophomore banquet and the incidents connected therewith, is enough to exasperate many, and we consider it safe to say all, the friends of Rose. The residents of the city have the newspapers as their only means of knowing what is being done by the students of the various institutions of the city, and as the papers take especial care to publish those things with which they can find fault, it is no wonder that Terre Haute people receive false impressions about the students at Rose. More than this the newspaper reports place the worst construction possible upon the incidents which happen in the life of college men and magnify little things in enormous proportions. These are then sent broadcast over the country and apparently increasing in falsity on the way, finally appear in other papers under sensational headlines of startling character. As a consequence of this sort of treatment of the affair in question, letters have lately been received at the Institute anxiously inquiring as to the number of men injured, and the number of deaths resulting. One would have reason to suppose that the students of Rose were a lot of half-civilized barbarians, whose delight it was to kill each other. How many of those who make these serious charges against them, have met them in society or have had dealings with them in business? If they had they would have met gentlemen, not "rowdies," as they seem to delight in calling them. The Polytechnic students stand just as high socially as any other equal number of men to be found in this or any other city. Make their acquaintance and judge for yourself. Meet them at the receptions or at the Institute and discover the mistaken ideas you have formed of them. It will never be regretted.

* * *

THE conditions set forth in a recent number of the *Wesleyan Argus* concerning the ventilation of recitation rooms, coincide very closely with those existing at Rose. Plenty of fresh air in comparatively small rooms containing a score or more men, is certainly essential for clear thoughts and good health. The same room is often used by successive classes for three and four hours at a time with little attention paid to the condition of the air. Such neglect is injurious to both professor and student, and a small amount of care exercised in thoroughly changing the air between the hours will prevent many cases of ill-health. We hope the weather will soon be pleasant enough to keep the windows open at nearly all hours, and our complaint then can only be against the pureness of Terre Haute atmosphere. Until such time, however, let there be some thought given to our physical welfare in the class-room, as well as to mental development.

NOTES ON THE DURATION OF LIGHTNING FLASHES

PROF. ARTHUR KENDRICK.

One meets frequently with the statement in the text-books and elsewhere that the time occupied by a lightning flash is extremely small, of the order at least of $\frac{1}{1000}$ of a second. And this is arrived at by the well-known fact, easily observed by any one for himself, that rapidly-moving objects, such as falling raindrops, and spokes of carriage or locomotive wheels, appear to stand still when illuminated by a lightning flash on a dark night. But a few observations that I made during one of the early showers in the spring of 1896, together with the distinct recollection of the impression of long duration made by two streaks of "chain lightning" seen in the summer of 1895, led me to believe that there is at least an apparent duration of quite appreciable length, in many cases. A number of very simple experimental observations subsequently made at various times by myself and by several friends at my request convinced me that the apparent duration is a real duration of physical phenomena and not a physiological effect of persistence on the retina or after image (though that may be itself not inconsiderable).

It may not be amiss to mention the nature of these observations though they would naturally suggest themselves to anyone. As a heavy shower comes up one will usually find, if he has an unobstructed view of the horizon, that frequent lightning occurs in a quite limited portion of the darkest part of the approaching clouds. This gives a good opportunity for simple eye observations. Upon the appearance of a flash let the observer wink both eyes and note if the streak of lightning persists after the eyes are opened. It will be found to do so frequently. This act may be performed very quickly but probably not by many people in less time than $\frac{1}{5}$ or $\frac{1}{10}$ of a second. This however does not eliminate the possibility that the after image may account for the apparent persistence of the lighting. Try it differently; this time close the eyes and on the appearance of a flash, (which of course makes itself known by diffused light through the eyelids) open the eyes quickly and see the streak of light. Probably no less time than $\frac{1}{10}$ of a second will, in general, be taken for this act, and yet one will very frequently catch the lightning flash before it has disappeared. A somewhat more striking and convincing test of the same sort may be made by turning the head and eyes about 50° or 60° from that point of the horizon, so that a flash will just be noticeable out of the corner of the eye. Turning quickly on its appearance one may often catch the "chain" or streak seeing it clearly in front.

These simple tests are to me conclusive as to the physical reality of the persistence, and as it seemed likely that so striking a fact must have been observed and noted by careful experimenters I took occasion to examine the files of a few journals for several years back. In confirmation of the above conclusion I find many notes, especially in "Nature," citing observations of various persons, and in some cases accompanied by reproductions of photographic plates. I have not made by any means a complete bibliography on this subject, but it may be interesting to many readers of THE TECHNIC to be referred to some of the notes most to the point.

As far back as 1835 Poggendorf's "Annalen der Physik und Chemie," p. 371, gives Dove's experiment with a rotating disc, which indicated that flashes often consist of a number of apparently instantaneous discharges. Mr. Petrie notes in "Nature," July 28, 1881, p. 284, some observations that he made on the Libyan Desert in May 19, '81. He states that he distinguishes clearly differences in duration of flashes grading from those apparently instantaneous to those which were

"spots of light occupying an appreciable time to travel from one cloud to another." He uses the word "spot-lightning" and some of his observations were evidently of phenomena very much akin to "globe-lightning" or "fire-balls" of which there are many authentic records, but which we cannot consider in the limits of this paper. Prof. Elihu Thomson, in "Nature," July 26, 1888, p. 305, speaks of observing as many as six flashes in quick succession in the same path. I find in "Nature," Aug. 30, 1888, p. 432, that M. Charles Mousette is quoted as attributing bad results in photographing lightning to movements of the camera. If, however, the flash is of so extremely short duration, as is insisted on by many, it would seem as though the steadiness of the camera were of little moment, for the displacement of the image on the plate would be inappreciable. Fig. 1 and Fig. 2 will serve to illustrate the character of the image of lightning as it would appear on the plate of a camera under different conditions. (The black streak of lightning in Fig. 1 will be referred to later on.) If the flash is single and instantaneous, L of Fig. 1 will be the image of the lightning, whether the camera be moved or not. If the camera is not moved then Fig. 1 is equally well the illustration of the photograph resulting from a succession of flashes along the same path. Except for the absence of detail, fine branches, etc., Fig. 1 is typical of the ordinary photograph of lightning taken with a well mounted camera. But there have been a good number of photographs, both accidental and intentional, which are typically represented by Fig. 2. Here L' and H' are the same flash and horizon as L and H in Fig. 1, with the conditions different from those just assumed; viz., that the camera moves horizontally, that the flash is not a single one, or that it has a duration of an appreciable fraction of a second. If it is two successive discharges, each of extremely short duration we shall have a and b, separate and sharp images, alike in form but displaced through some distance horizontally. If it is a single discharge of long duration then L' is a ribbon of light. [There are cases recorded where the "ribbon" flash is found on the plate of a stationary camera, but as this effect can be reproduced by certain relations of the light and the glass, and can be shown to be due to multiple reflection, they will not be considered.]

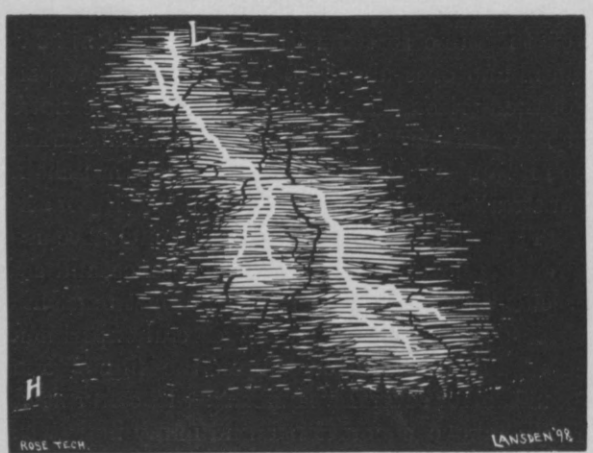


FIG. 1.

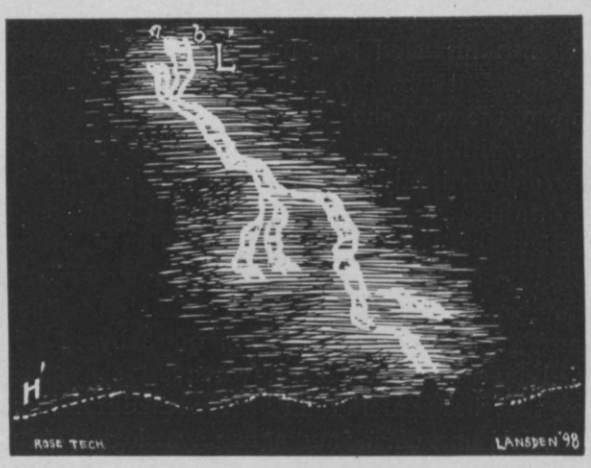


FIG. 2.

In a recent personal communication Prof. Alexander McAdie, of the United States Weather Bureau, tells me of a photographic plate that he took of a flash, showing plainly two distinct streaks or paths of the lightning, nearly coincident, one probably following the other in a very short interval of time. The plate was stationary. He also speaks of some "single flashes spread out on a revolving mirror, which seem to preserve their identity for a relatively long time." Un-

fortunately the shortness of the time before this issue prevents correspondence which might secure for this article cuts representing these. The latter would be especially interesting in giving perhaps a fair estimate of the time occupied by the single oscillatory discharge, or rather of the time through which the path of that discharge continues to glow, for there seems to be some evidence, mentioned below, that the glow lasts longer than the discharge. With the possible exception of that taken from the rotating mirror just mentioned, I have not found described or reproduced any photograph that would indicate that the ribbon form occurs in the sense of being a solid band of light, *a-b*, but in all cases mentioned in the notes I have seen, *a* and *b* and sometimes several in addition are distinct flashes or discharges of identical form, though frequently connected more or less solidly by streaks of light. Dr. H. H. Hoffert, whose work is quoted below, says that he has inspected the photographs of ribbon and banded lightning collected by the Royal Meteorological Society, and that he thinks that there is no doubt that the explanation of these is afforded by the successive discharges (*a*, *b*, etc.) and the luminous streaks connecting them.

In *Nature*, October, 1888, p. 555, M. Trouvelot is said to have found some photographic evidence that lightning flashes of some duration, and in "*La Nature*," 1889, II, p. 63, he describes in a note the result of an exposure by a camera in rapid oscillatory motion right and left. The plate showed six images of the same flash (i. e. Fig. 2 would require *a-b-c-d-e-f* to represent it.) But the best notes that I have yet found published are an article by Dr. H. H. Hoffert in the *Phil. Mag.*, 1889, II, p. 106, accompanied by plate IV, reproducing a photograph taken with a moving camera, and an article by Professor Ogden N. Rood in the *Am. Jour. Sci.*, 1873, I, p. 165.

The storm observed by Mr. Hoffert was over London on the evening of June 6, 1889. Independent observers noted in many cases a "flickering effect," and five or six repetitions in a flash could sometimes be counted in quick succession. Indeed, it was even found a movement of the camera in one direction (though probably not the same swing) and (IV, V, VI) in the other direction. This makes at least one and one-half oscillations of the camera, or over one whole second, between first and last discharges. I infer from the article that the whole set of flashes appeared to the eye as practically a single stroke of lightning. Mr. Hoffert, from a study of the original photograph, finds reason for thinking the probable order to be (I, II, III), (VI, V, IV), (VII, VIII).

by Professor Herschel on the occasion of this same storm that a camera could even be directed in time to get a photograph of a flash. Fig. 3 gives a fair diagramatic reproduction of the plate taken by Mr. Hoffert. This camera was held in the hands and oscillated nearly horizontally with a period of about $\frac{3}{4}$ second. (I, II, III), (IV, V, VI), (VII, VIII) are three different flashes of lightning, having respectively three, three, and two discharges. It will be noticed that the form of the separate discharges of each group is identical, thus I would coincide with II and III if superimposed on them. I is quite branched, while II shows only a trace, and III is without branches. Curves connecting similar points on (I, II, III) and (VII, VIII) show that these occurred during

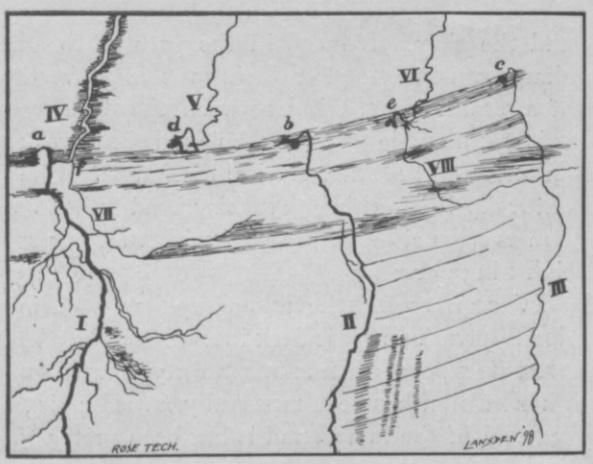


FIG. 3.

There is in the photograph a very noticeable parallel shading or streaking from one discharge to the succeeding one which can not fully be

reproduced in the cut here. These streaks seem to emenate from especially brilliant points on the path of the discharge and lead one to think that the air or *something* (perhaps ozone) is heated to incandescence and retains its glow for a time, or that it possibly phosphoresces. At all events this appearance of the plate is intimately connected with the "beaded" appearance of many streaks of lightning that any one may observe as the flash dies out. And I may suggest here that the method mentioned in my second paragraph, of turning the head and eyes quickly to catch the flash overcomes much of the objections of physiological effects, and will reveal an unmistakable beaded chain remaining after the more brilliant flash. And this, it seems to me, involves the question as to the coincidence of the electric discharge and the glow. If spots in the path of the discharge continue to glow during the large fraction of a second intervening between the discharges, is it not possible that the whole glowing streak is an after effect of the electrical discharge? One is naturally led to think that this "bead" phenomenon may be closely connected with that of "spot lightning" or "fire-balls."

IV appears on the photograph as a curious double streak and it is dark instead of light. This presents a point of some uncertainty, but the same phenomenon has been repeatedly noticed; viz., of reversal of the image, and it has been pretty well proven that it may occur in case of over-exposure and light from another source. (The double line seems to me to mean two discharges, making that flash a quadruple one.) The reversal of the image on the negative is illustrated by the dark streak of lightning in Fig. 1, which, though not an exact copy of a plate, represents very well the appearance found on many negatives.

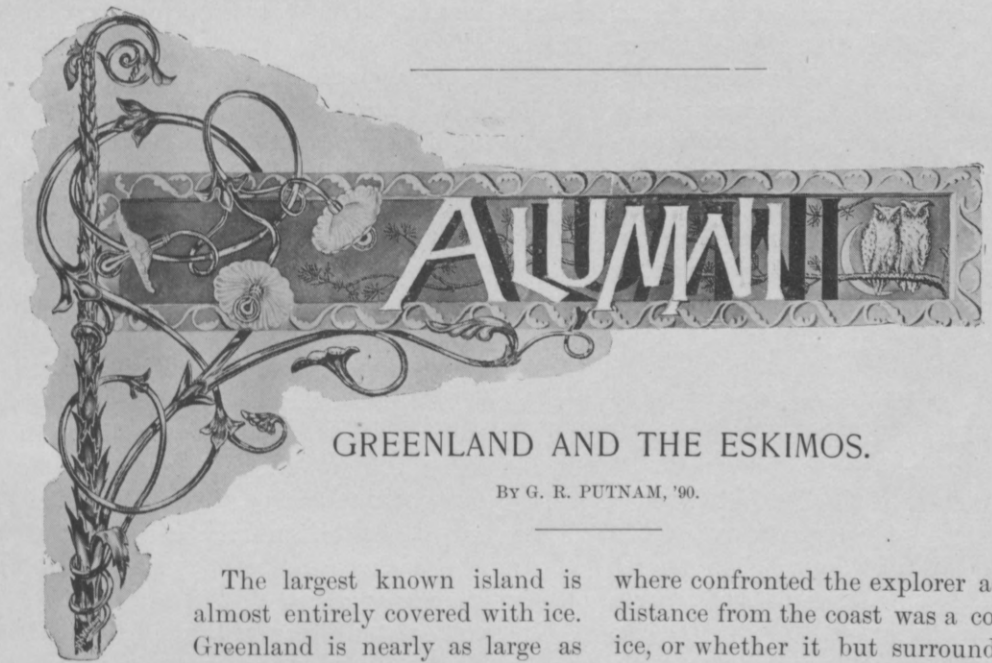
I think this photograph suggests an adequate explanation of the remarkably slow apparent propagation of the two "chain lightning" flashes that I particularly noticed in the summer of 1895, and referred to in the opening paragraph. I can best describe the appearance by likening the flash to a long snake quickly gliding out to his full length from under cover. There was no question as to the direction in which it was propagated—from below up—nor as to the time it lasted, being a large fraction of a second, if not more than one second. This photograph suggests immediately that the flash as I saw it was composed of several sets of discharges, like I and IV, occurring end to end and progressive in time as well as in direction.

Mr. Hoffert's photograph seems to show beyond question the fact of complexity in lightning flashes, and to confirm in a satisfactory way the conviction which one arrives at by careful though simple eye observations, that the total time occupied by what we see and call "a flash" is very commonly as long at least as one half second, or even a second.

The discussion of the character and duration of the discharges composing a flash (i. e. of I, II, etc.) would lead us very quickly out of the domain of direct observation into that of theory and analogy. But I think we may safely believe that these *single* discharges (if we may use that term) are, like the sparks through air from condensers, oscillations of very great frequency, say some hundred thousand per second, and that the duration of that succession of oscillations is very variable. Prof. Rood's experiments above referred to show, it seems to me very conclusively, that the brilliant light caused by these component discharges lasts anywhere from $\frac{1}{20}$ to $\frac{1}{1600}$ of a second. Prof. Rood, from his experiments, arrives also at the same conclusions as to time of visible flash that have been drawn from the study of Mr. Hoffert's photographs. And it seems a pity that the results of his experiments made as far back as 1873 have not been more widely circulated in text-books.

Interesting fundamental questions as to the real electrical phenomena involved in the chargeing and discharging of the clouds, these great condensers in the air, as to the dielectric behavior of the air, as to the possible chemical action involved in the glowing path of a discharge, as to the real duration of the electrical discharge that causes the illumination, if there be indeed a distinction between the illumination and the dis-

charge of electricity, and if not as to the quantitative relations involved in so long continued oscillations as $\frac{1}{20}$ of a second, such questions as these remain still unanswered, and can hardly be answered by the camera alone. Many of my readers, however, are more or less expert in use of the camera and I would encourage such to improve any opportunities that may occur to secure photographs of lightning or of objects illuminated by lightning flashes, and would suggest that with camera in hand snap shots be attempted. Many, probably most, such plates will be interesting repetitions of phenomena already shown, some may give new information.



GREENLAND AND THE ESKIMOS.

By G. R. PUTNAM, '90.

The largest known island is almost entirely covered with ice. Greenland is nearly as large as Germany, France and Spain combined, and of this area four-fifths is buried beneath the great ice sheet. The only portion free from ice and snow in the summer is a mountainous strip varying in width from a few miles to a hundred, lying between the ice and the sea. Deeply indented with fjords, broken into islands and peninsulas, consisting in a large part of bare rock, studded with precipitous mountains, and all lying in an arctic climate, it seems difficult to believe that this narrow bordering region furnishes a home for a considerable population of apparently contented people; but not more difficult, perhaps, than to associate this remarkable island with the peculiarly anomalous name that it bears. Greenland is about 1400 miles long north and south, and 700 miles wide in the broadest portion. It was long a disputed question whether the ice sheet which everywhere confronted the explorer advancing a short distance from the coast was a continuous field of ice, or whether it but surrounded bare land in the interior. The continuity of this mighty ice desert was proved by Nansen, who crossed the southern portion from the east to the west coasts of Greenland in 1888, and by Peary, who in 1892 crossed from the northwest to the northeast coasts, and returned, a trip of 1300 miles, with dogs and sleds over the ice; this journey and its repetition by the same explorer in 1895, are remarkable in the annals of Arctic exploration, for the boldness of their plan, the extent of the sledge journey and for the light they threw on the conditions existing in northern Greenland, and the discovery of the northeastern termination of the island, and of other land beyond. The thickness of the ice in the interior is unknown, but it is sufficient to obliterate all evidences of the roughness of the land beneath. The interior ice is so smooth as to enable the explorers to sail on their sleds long

distances over it. Only as the coast is approached and the ice slopes down to near the level of the summits of the bordering mountains does the roughness of the land begin to be evident on the surface of the ice, and an occasional peak projects up through it, forming a weird looking island, called by the Eskimo name "nunatak," in this congealed sea. This mighty mass of ice, sufficient to cover the entire United States with a layer probably 500 feet in thickness, is but the gradual accumulation of falling snow. The pressure is so enormous that through every valley in the bordering mountains there is forced out towards the sea a river of ice. Here, indeed, the flow of ice is seen on a majestic scale. Into Umanak Fjord on the west coast, which was visited by the writer during the past summer, no less than eleven large glaciers discharge. One of these, the Great Karajak, has a width of four miles at its termination in salt water, and moves with a velocity of nearly forty feet a day. A single iceberg breaking off into the sea from its face has been estimated to contain 24,000,000 cubic yards of ice. It is stated that the great glacier near Upernavik moves with a velocity of 90 feet a day. This region on the west coast immediately north of the Arctic circle, contains some of the largest and most active glaciers, and sends out a great proportion of those bergs, which, after a long journey southward with the Labrador current, become a menace to transatlantic commerce. The surface of the glaciers near their termination is usually covered with jagged pinnacles of ice, deeply crevassed between, in strong contrast with the smooth and level slope of the interior ice cap which forms the distant horizon.

The climate of Greenland is a decidedly arctic one. In northwest Greenland the temperature sometimes descends to—60° or to—70° F., and at Upernavik, the most northern outpost of civilization in the world, the mean annual temperature is 13° F., and the mean summer temperature but 38° F. Last summer the writer met in Umanak Fjord a Dane in charge of a minor settlement, who was endeavoring to keep a meteorological record, but to his evident chagrin the instruments furnished him seemed inadequate for the purpose, for his thermometer only read to—40° F., and he informed us that for more than 20 days in February, 1896, the mercury went below the scale into the bulb and stayed there. It is no wonder that the Eskimo idea of a place of future punishment is a very cold, instead of a super-heated region. Nevertheless, the climate on the west coast of Greenland is milder than that of the east coast, or that of the opposite side of Davis strait, and this fact partly accounts for the much greater development of the west coast as a human abode. In the fjords which deeply indent this coast the summer climate is not uncomfortable, owing to the long hours of sunshine. As a result of this, also, in the summer months there spring forth in every nook furnishing sufficient soil, an abundant vegetation, moss, grasses, wild flowers and stunted shrubs. In southern Greenland low trees are found, but in the regions visited last summer no vegetation was seen growing more than a few inches above the ground. The vegetation furnishes some berries as food, as well as peat and brush for fuel, but the summers are so short that the natives make no attempt to cultivate any food vegetables or grains.

The west coast of Greenland from Melville Bay to Cape Farewell, and a portion of the east coast, belong to Denmark. This includes practically all of inhabited Greenland, except the small region about Inglefield Gulf which has been several times visited by Peary, and perhaps some yet unexplored regions on the east coast. The west coast is divided by the Danes into two Inspectorates, each under an Inspector, and these again into twelve Districts, each in charge of a "Colonibestyrer" or Governor. The entire administration is in the hands of the "Kongelige Grönlandske Handel" (or Royal Greenland Board of Trade), a government bureau in Copenhagen. This Board has a monopoly of the trade of Greenland. Supplies are sent from Denmark to the various trading posts each year, and are sold to the natives at but a slight advance over their cost. To these posts, also, the natives bring their surplus products, for which they are paid about one-fourth

of the European market value. To give some idea of the commercial production of the region, the report of the trade for the season of 1894–95 shows the following exports in round numbers: oil (mostly seal, shark and cod) 17,000 barrels; sealskins (hair seal) 40,000; bird feathers 12,000 pounds; eider down 600 pounds; bear skins 80; fox skins 3,000. In addition to these there is some ivory obtained from the walrus and narwhal, and some other furs. Probably considerable less than half of the annual catch reaches the trading posts, the greater portion being consumed in the daily life of the Eskimos. In former times there was a slight profit to the Danish government in this Greenland trade, but the annual production has diminished in some lines, certain animals having been almost exterminated, and at the same time the cost of administration has gradually increased, so that at the present time there is a considerable annual deficit. In order to protect the natives the Danes have prohibited all other trade or settlement; not even Danes other than the government officials and employes are allowed to settle there.

There are about 10,000 Eskimos in Danish Greenland. They have been in contact with civilization for nearly two centuries, and are, to some extent, intermixed with foreign blood, and yet they have persistently adhered, in a great measure, to their primitive manner of life, which is a most striking example of the adaptability of man to remarkable surroundings. Confined almost entirely to a narrow coast strip, with no means of communication save the water and the ice, subjected to fearful extremes of cold, deprived of sunlight for a considerable portion of the year, denied almost all natural vegetable food, they have been compelled by the mere struggle for existence to take the utmost advantage of the scanty favors nature has shown them, and to battle most persistently with those climatic conditions which would seem to render continuous existence in this region almost unendurable. Nevertheless, they appear by nature to be a light-hearted and contented people. They are one of the most honest and peaceable races in the world. It is stated that during ten or twelve years there was only one case of homicide, and five or six cases of grosser theft, brought before the district councils. There is not a jail in Greenland, and during several weeks spent in Umanak Fjord the writer did not see a single quarrel between Eskimos, not even among children. Their hunting appliances do great credit to their mechanical ingenuity. The most important of these is the kayak, a light, frail skin boat in which they pursue the seal and and other game. These boats are about 18 feet long and only as many inches wide. The kayaker sits in a circular opening in the deck with an apron tied about him so that not a drop of water

GREENLAND WOMEN.

can get into the boat, even should a wave wash over. They perform remarkable feats in these boats, in which a novice has difficulty in even keeping upright. One of the most striking of these is for the kayaker to capsize and right himself again without getting out of the boat. The kayak is provided with a number of most ingenious hunting appliances, including a harpoon with detachable point carrying a line attached to an air bag.

In the winter the fjords are frozen, and the principal means of travel are the sleds and dogs.

These wolfish-looking Eskimo dogs are found in large numbers in every village, and are the only domestic animal. The natives live in houses built of rock and turf, low and flat-roofed, or sometimes in skin tents in the summer. The hair seal furnishes most of their food as well as clothing, and the oil is used for fuel and light. Men and women dress very much alike, except that the latter pay more attention to ornamentation. Their bright-colored leather boots and fur garments were usually decorated with very neat and tasteful needlework, and often a wide necklace of beads adorned the neck.

At every considerable settlement the Danes have established Lutheran churches and schools,

ESKIMO HOUSE AND WOMAN.

where the Eskimo language is taught. The majority can read and write, and the Bible and several other books have been printed for them in Eskimo, and at Godthaab there is published a monthly paper. The language is a peculiar one, the meaning of a word being capable of almost endless extension by the addition of affixes and suffixes. The following sentence well illustrates their tendency to economize words, but at a reckless extravagance of letters: "tamassa kukussarpatdlartokarnaverutigssiaugaluit." A stranger would not be apt to guess correctly the translation of this formidable array of letters, for its meaning is, "this is written that man shall not fail to understand it."

On last summer's voyage, besides the Greenlanders, some Eskimos were met with on the Labrador coast, in Hudson Strait, and in Cumberland Sound. The Eskimo races extend from Eastern Greenland to Northeastern Asia—an extent of 5000 miles. Their language and customs prove them to be of common origin and distinct from the Indians south of them.

The early history of Greenland is a most romantic one. Erik the Red, exiled from Iceland for murder, made a voyage of exploration to Greenland in 983. The land had been previously seen by Gunbjörn of Iceland, driven thither by a storm. It is said that Erik gave the name Greenland to the country in order to induce colonization. In 986 he took out a considerable expedition. Leif, a son of Erik, discovered Vinland, or America, in 1000. In time the colonies located in Southwestern Greenland grew, as shown by the fact that there were sixteen churches; many ruins of these as well as the dwelling houses are still in existence. In 1261 the colonists voluntarily became subject to the king of Norway, and commerce continued with that country at least until 1484. For a century these settlements were apparently forgotten. The coast was visited by the early English explorers, Davis, Hudson and Baffin (1585 to 1616), and was found to be occupied only by the Eskimos; none of the Iceland colonists remained. Their fate is one of the romantic mysteries of history; the general and natural supposition is that they were exterminated by the Eskimos, though this seems much at variance with their present peaceable disposition. Permanent European occupation was again established when Hans Egede, a Danish missionary, landed on the west coast in 1721 and founded Godthaab.

SOME QUERIES.

The following questions were received from an inquiring Alumnus, the answers of which are to be found below.

THE TECHNIC will be heartily willing to open

its columns at all times to such questions as may interest its subscribers, and will attend to them as far as contact with faculty, students and library permit:

1. In a solution of an electrolytic salt being subjected to electrolysis, is there any definite ratio between the amount of the salt decomposed and the amount of the dissolving liquid which is decomposed simultaneously; for instance, supposing a 30 per cent. solution of common salt in water, what proportion chlorine will be given off per ampere hour up to N grams of hydrogen?

2. What effect has the density of solution, temperature of solution, density of current on electrodes, distance apart of the electrodes, circulation between electrodes, surface roughness of electrodes, supposing these in all cases to be carbon plates, have on the above ratio of its decomposition? This question has the following practical bearing:

Various modifications of this electrolytical decomposition are used for the production of chlorine for bleaching purposes, and the writer has been requested to answer the above questions and has been entirely unable to obtain any data from any sources which are at his disposal.

In the electrolysis of a solution of sodium chloride there is found first, at the positive and negative poles respectively, chlorine and metallic sodium. Then, by a secondary reaction, the sodium combines with water to form sodium hydroxide, while hydrogen escapes, the chlorine escaping at the positive pole. The amount of salt decomposed is directly proportional to the current strength. Theoretically .0027 lbs. of chlorine and one thirty-fifth as much hydrogen are formed per ampere hour. Such factors as concentration, temperature, size, material and distance between electrodes have no theoretical effect but to alter current by altering resistance. Concentration plays an important part in practical electrolysis as the nature of the secondary reactions of the ions depend largely upon it. Exact figures are determined only by experiment.

ALUMNI NOTES.

WANTED.—June number of THE TECHNIC for 1895.—ED. TECHNIC.

Bixby, '92, is connected with the Central Cycle Co., Indianapolis, Ind.

Hendrickson, '94, is with the Standard Iron Works, San Diego, Cal.

Green, '96, is connected with the Sioux City Brass Works, Sioux City, Iowa.

Wiggins, '95, of Pittsburg, was is the city February 21–22, visiting his many friends.

P. J. Klinger '96 is married and is with the Barney & Smith Car Works, Dayton, Ohio.

We understand that Blinks, '94, will enter his father's gas works at Michigan City, Mich.

Mory, '94, has been promoted to the head of a department in Armour & Co.'s establishment in Chicago.

A number of the Alumni are very slow in sending in their subscriptions. It is desired that all dues be paid up at once.

Sanborn and Sinks '96 are engaged in laying track for the Hammond and Blue Island R. R. Hammond, Ind.

Beebe and Wells, '96, have received the contract to wire the fine new residence recently built by an aunt of Werk, '96.

W. S. Speed, '95, has been at work during the summer designing a cement mill which is now under erection at Speeds, Ind.

McTaggart, '95, formerly with the Pittsburg Testing Laboratory, has accepted a position with the Pittsburg Reduction Company.

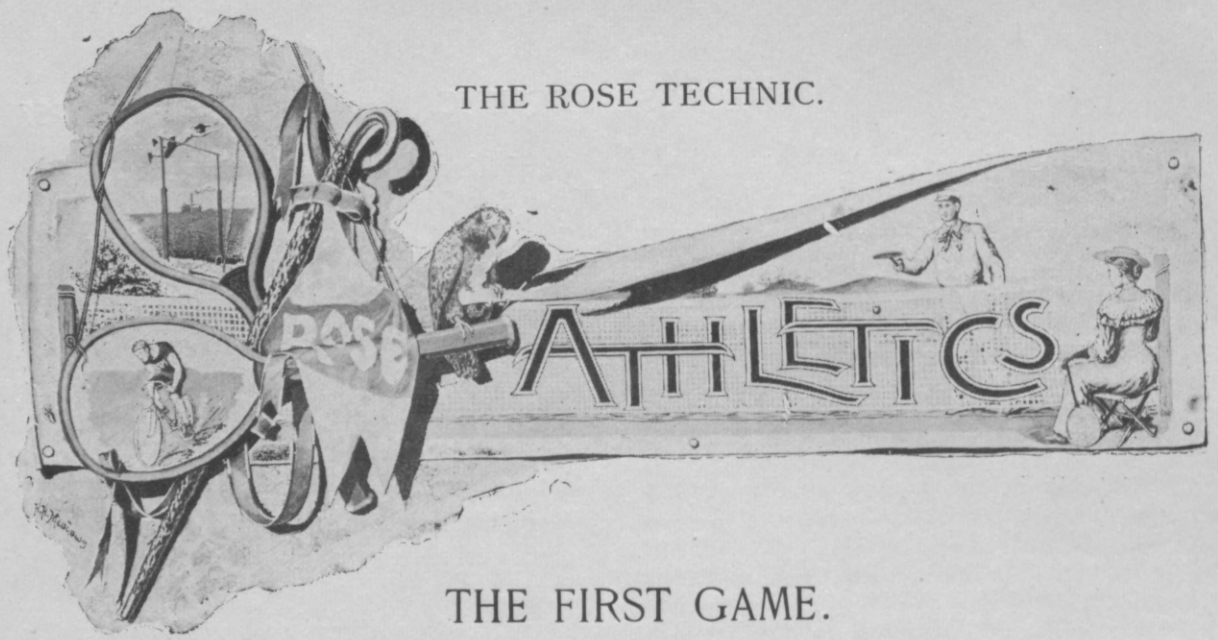
Hammond, '89, has prepared specifications for the Frankfort, Ind, electric and gas lighting system, copies of which have been sent to the Institute.

E. Walser, '96 has gone to New Mexico to accept a position with the Strain Assaying Plant, Red River City, Taose Co. He will be sixty miles from the nearest railroad.

Huthsteiner, '93, has taken a position as erecting engineer with the Frick Co., Waynesboro, Pa. He has been in the city visiting his brother, '00, for the past few days.

THE NEW WOMAN.

She knows the arts and sciences,
On politics she can quibble,
But in the kitchen she can't tell
A fry-pan from a griddle.—*N. I. B. Z.*



THE FIRST GAME.

Rose played her first basketball game in the city league series on the night of Friday, March 12, her opponents being the city Y. M. C. A. team. The game was a well-played one, verging perhaps on the rough during the first half, but quieting down into skillful playing during the last. The Y. M. C. A. team was a redoubtable one to run up against first as it has won the state championship for the past several years, and most of the men are veteran players. Basketball is new at Rose and our men found that interclass games are different from games with experienced players. In two weeks we could play them again and the result would probably be entirely different—with different umpires.

The teams lined up as follows:

R. P. I.	Position.	Y. M. C. A.
A. Kidder, Hegarty	Right Forward	Temple
Pfleging	Left Forward	Ault
Jumper	Center	Franklin
Freudenreich	Left Guard	Heinig
Huthsteiner	Right Guard	Rippetoe

Referee, Instr. McMeans. Umpire, Kimmel, Y. M. C. A.

Goals from field, Y. M. C. A., 4; Rose, (by Hegarty) 1. Goals from fouls, Y. M. C. A., 4. In the second half, Hegarty took Kidder's place, Jumper went back to guard and Freudenreich played center. Score, Y. M. C. A., 12, R. P. I., 2.

This game was followed by one between the High School and State Normal. The former won by a score of 10 to 6.

THE BASKETBALL SERIES.

The final game of the initial series was played between the Junior and Freshman teams on Tuesday night, February 16th, the Juniors easily winning by the good score of 16 to 3. The Freshmen played with but little energy and only won their points on fouls. This was the line up:

Juniors.	Position.	Freshmen.
N. Kidder	Right Forward	Pfleging
Austin	Left Forward	S. Kidder
Ryder	Center	Huthsteiner
Hubbell	Right Back	Appleton
Freudenreich	Left Back	McCosker

Umpire—Instructor McMeans. Referee—Instructor McCormick. Two halves of 20 minutes, with 10 minutes intermission. Goals from field, Juniors 8; goals from fouls, Freshmen 3. Total score—Juniors 16, Freshmen 3.

This completion of the first series found the Sophomores in the van with three games won and none lost. The Juniors came next with two games won and one lost, the Freshmen third with one game won and two lost. The Seniors lost three games in succession and were thus dropped from the schedule.

The first of the second series of basketball games was played on the evening of February 24th, between the Junior and Freshmen teams. The

game was well played and interesting throughout, and at the end of the first half looked like a sure victory for the Freshmen, the score then being 6 to 4 in their favor. In the second half the Juniors took a brace and won out easily. The Freshmen claim that the indisposition of several of their men was the cause of the defeat. The game was entirely free from rough playing nor was there any back talk. No fouls were called throughout the play. The players and details of the game were as follows:

JUNIORS.	POSITION.	FRESHMEN.
Austin	Right Foward	Pfleging
Kidder	Left Forward	Hegarty
Ryder	Center	Huthsteiner
Freudenreich	Right Back	McCosker
Hubbell	Left Back	Appleton

Umpires—Instructor McMeans; Referee—Instructor McCormick; Score, Juniors, 14; Freshmen, 6.

The second game of the second series occurred on Saturday afternoon, February 27. It was an exciting game between the Freshmen and Sophomores in which the latter suffered their first defeat of the season. The Freshmen were in excellent form and did some remarkably clever playing. Especially noticeable was the goal throwing of Pfleging, and the all around work of Hegarty and Huthsteiner. They were too much for the heavier men of the Sophomore team, and the game was never for an instant in danger of being lost. For general good playing this game excelled all previous ones although the work of the Sophomores was not very creditable. This was the line up:

SOPHOMORES.	POSITIONS.	FRESHMEN.
Kidder	Right Forward	Hegarty
Stone	Left Forward	Pfleging
Jumper	Center	Huthsteiner
McLellan	Right Back	McCosker
Davis	Left Back	Kidder

Umpire—Instructor McMeans. Referee—Instructor McCormick. Time of halves—20 min., with 10 minutes intermission. Score—Freshmen, 21; Sophomores, 9.

The final game of the second series put the Sophmores out of the race for the championship. It would seem that the Juniors had an easy victory, if the score be any indication of the play. As a matter of fact, the game was the most desperately fought one of the whole series and although interesting from a spectator's standpoint was nevertheless a blood-chilling one. Fearful collisions between opposing players were innumerable, knock down blows unintentionally administered occurred every second, and the rush of players from one side to the other made the brick walls of the gymnasium quake. The Juniors played aggressively, the Sophomores desperately, but there never was a chance of the latter winning the game. The goal throwing of N. Kidder was especially good. Hubbell and Freudenreich both threw goals the whole length of the gymnasium, quite accidentally, of course, but they were thrilling just the same and counted the regulation number of points. The affectionate embraces of Austin and A. Kidder were the cause several times of fouls being declared on both sides. The line of battle was as follows:

JUNIORS.	POSITION.	SOPHOMORES.
N. Kidder	Right Forward	Stone
Ryder	Left Forward	A. Kidder
Freudenreich	Centre	Jumper
Austin	Right Back	Davis
Hubbell	Left Back	Holliger, Kittredge

Umpire—Instructor McMeans. Referee—Pfleging, '00. Time of halves, 20 minutes, with 10 minutes intermission, Score—Juniors 22, Sophomores 8.

Saturday, March 13th, the final game for the school championship will be played between the Juniors and Freshmen. It is hard to predict which team will win. The Juniors defeated the Freshmen in their first game, but the latter have shown such marked improvement since then that it will not be surprising if the tables are turned on the 13th. Both teams have defeated the Sophomores recently by nearly the same score, but popular sentiment seems to slightly favor the Juniors. The game is looked forward to with great interest, and undoubtedly a large number of spectators will be out to see the game.

MEETING OF FIELD DAY EXECUTIVE COMMITTEE.

The first meeting of the executive committee was held Thursday noon, March 4th. Nearly the entire time was taken up by a discussion of the duties of the committees of which the members are chairmen. Mr. Montgomery was asked to

have printed some letter heads and guarantee fund blanks. Mr. Arn was asked to look into the matter of having the necessary new hurdles built. Some discussion ensued as to the establishing of a guarantee fund and it was suggested that each member hand in at the next meeting names of those who would most probably subscribe to this fund. Mr. Shaver announced that he would at once take steps to secure the fair-grounds for field day.

GYMNASIUM MENTION.

Some new apparatus has been added to the gymnasium equipment during the past month. It consists of a horizontal ladder, a pole-vaulting block, a fine 12-pound gymnasium shot, and a set of potato race standards. The apparatus for indoor pentathlon events is now complete.

One of the arc lights has been giving considerable trouble of late as it refuses to burn more than half the time. The night classes hope to see the trouble remedied soon.

INDIANA STATE RECORDS.

It has been thought well at this time to give a general summary of State Field Day records since Rose won her first pennant in 1890. All data have been taken from old copies of the TECHNIC and may reasonably be supposed to be accurate and reliable. It has been impossible to find any data relative to the first meet, in which Rose had no part, but it is hardly likely that any records were made at that meet which have not since been beaten. If any inaccuracies be noted the athletic editor will be very glad to learn of them, since a complete and thoroughly reliable table at this

Number.	EVENT.	1890.		1891.		1892.		1893.	
		Winner.	Record.	Winner.	Record.	Winner.	Record.	Winner.	Record.
1	100 yards dash	Wabash.	10⅛ sec.	R. P. I.	10⅜ sec.	R P. I.	10⅜ sec.	R. P. I.	11 sec.
2	Putting 16 lb. shot	R. P. I.	27 ft. 7 in.	R. P. I.	32 ft. 4 in.	Purdue.	33 ft 2 in.	DePauw.	35 ft. 5 in.
3	Standing broad jump	DePauw.	9 ft. 10 in.	Purdue.	9 ft.	Purdue.	9 ft. 11½ in.	Purdue.	10 ft. 4½ in.
4	One mile walk	R. P. I.	8 min. 15 sec.	Wabash.	8 min. 8⅜ sec.	Wabash.	8 min. 45 sec.	Wabash	8 min. 4⅜ sec.
5	One-half mile bicycle	*		*		*		*	
6	Pole vault	*		R. P. I.	7 ft. 8 in.	Wabash.	8 ft. 9¾ in.	R. P. I.	9 ft. 1 in.
7	220 yards dash	Wabash.	26 sec.	Purdue.	24⅛ sec.	R. P. I.	24⅛ sec.	R. P. I.	23⅝ sec.
8	Hop, step and jump	*		*		Earlham.	40 ft. 9 in.	Earlham.	44 ft.
9	120 yards hurdles	R. P. I.	16½ sec.	Wabash.	19⅜ sec.	Purdue.	18⅜ sec.	Wabash.	18⅜ sec.
10	Throwing 16 lb. hammer	Wabash.	51 ft. 8 in.	R. P. I.	69 ft. 11 in.	R. P. I.	85 ft 9½ in.	R. P. I.	96 ft. 8 in.
11	Running broad jump	R. P. I.	18 ft. 9 in.	DePauw.	17 ft. 8 in	Earlham.	19 ft	Wabash.	19 ft. 5½ in.
12	440 yards dash	*		R. P. I.	58⅝ sec.	R. R. I.	55 sec.	R. P. I.	55⅜ sec.
13	One mile bicycle	*		R. P. I.	3 min. 54 sec.	Earlham.	3 min ⅛ sec.	Butler.	2 min 46⅛ sec.
14	Running high jump	R. P. I.	5 ft. 2 in.	R. P. I.	5 ft. 3½ in.	R. P. I.	5 ft. 2 in.	Purdue.	5 ft. 2¼ in.
15	One mile run	DePauw.	5 min. 44½ sec.	R. P. I.	5 min. 18⅛ sec.	Purdue.	5 min 1⅜ sec.	Purdue.	4 min. 53⅜ sec.
16	Pentathlon	*		*		*		*	
17	Tennis, Singles	R. P. I.		R. P. I.		R. P. I.		R. P. I.	
18	Tennis, Doubles	Wabash.		*		R. P. I.		R. P. I.	

Number.	EVENT.	1894.		1895.		1896.		Present Record.	
		Winner.	Record.	Winner.	Record.	Winner.	Record.	Holder.	Record.
1	100 yards dash	Purdue.	10⅜ sec.	Purdue.	10 sec.	DePauw.	10⅛ sec.	Purdue.	10 sec.
2	Putting 16 lb. shot.	Purdue.	39 ft. 5 in.	Purdue.	34 ft. 5 in.	DePauw.	36 ft. 9½ in.	Purdue.	39 ft. 5 in
3	Standing broad jump	Purdue.	10 ft. 5½ in.	Purdue.	10 ft. 6½ in.	Purdue.	10 ft. 8 in.	Purdue.	10 ft 8 in.
4	One mile walk	R. P. I.	8 min. 7⅜ sec.	R. P. I.	8 min. 2 sec.	R. P. I.	6 min. 56⅛ sec.	R. P I.	6 min. 56⅛ sec.
5	One-half mile bicycle	R. P. I.	1 min. 9 sec.	R. P. I.	1 min. 11 sec.	R. P. I.	1 min 7⅜ sec.	R. P. I.	1 min. 7⅜ sec.
6	Pole vault	R. P. I.	9 ft. 10 in.	R. P. I.	9 ft. 11 in.	R. P. I	9 ft. 10½ in.	R. P. I.	9 ft. 11 in.
7	220 yards dash	R P. I.	24 sec.	Purdue.	23⅜ sec.	Purdue.	23⅜ sec.	Purdue.	23⅜ sec.
8	Hop, step and jump	Earlham.	42 ft.	Earlham.	44 ft. 11 in.	Earlham.	43 ft. 2¼ in.	Earlham.	44 ft 11 in.
9	120 yards hurdle	Purdue.	18⅛ sec.	Wabash.	18⅜ sec.	Purdue.	19 sec.	R. P. I.	16⅛ sec.
10	Throwing 16 lb. hammer	Purdue.	98 ft. 3 in.	R. P. I.	109 ft. 5½ in.	Purdue.	105 ft.	R. P I.	109 ft 5½ in.
11	Running broad jump	Earlham.	20 ft. 1 in.	Earlham.	20 ft. 10 in.	Earlham.	19 ft. 5⅜ in.	Earlham.	20 ft. 10 in.
12	440 yards dash	R. P. I.	54⅛ sec.	R. P. I.	54⅜ sec.	Earlham.	52⅜ sec.	Earlham.	52⅜ sec.
13	One mile bicycle	R. P. I.	2 min. 41 sec.	R. P. I.	2 min 46⅛ sec.	R. P. I	3 min. 13⅛ sec.	R. P. I	2 min. 41 sec.
14	Running high jump	Earlham.	5 ft. 2 in.	Earlham.	5 ft 6 in	Purdue.	5 ft. 5½ in.	Earlham.	5 ft. 6 in.
15	One mile run	Earlham.	5 min. 5 sec.	Earlham.	4 min. 54⅜ sec	Purdue.	4 min. 47⅜ sec.	Purdue.	4 min. 47⅜ sec.
16	Pentathlon	R. P. I.		R. P. I		Purdue.		Purdue.	
17	Tennis, Singles	Butler.		R. P. I.		R. P. I.		R. P. I.	
18	Tennis, Doubles	Butler.		R. P. I.		R. P. I.		R. P. I.	

*Event did not take place.

Indiana State Normal took part for the first time in 1895. At that meet she won one second and two thirds.

time would be of great value as a basis of comparison.

Apparent discrepancies exist in the tables. For instance, it may be noted that while the first table credits Rose with only nine firsts in 1891, the table of points gives her eleven. This is due to the fact that obsolete events, such as tug of war, high kick, etc., are not mentioned in the first table.

COLLEGE.	Ranks.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
ROSE.	Firsts	9	11	9	10	10	12	6
	Seconds	7	4	7	6	11	8	6
	Thirds	7	7	7	2	2	6	7
	Totals	73	74	73	70	85	90	55
PURDUE.	Firsts	*	2	7	5	7	6	9
	Seconds	...	3	4	5	4	8	5
	Thirds	...	0	3	5	6	6	5
	Totals	...	19	50	45	53	60	65
EARLHAM.	Firsts	*	*	3	1	4	4	3
	Seconds	...	...	5	2	1	3	4
	Thirds	...	...	1	5	5	5	2
	Totals	...	...	31	16	28	34	29
WABASH.	Firsts	6	3	3	3	0	1	0
	Seconds	9	6	3	1	2	0	1
	Thirds	8	2	2	3	7	0	1
	Totals	65	36	26	21	12	5	4
DEPAUW.	Firsts	4	2	0	1	0	*	2
	Seconds	3	5	1	1	1	...	2
	Thirds	4	2	4	1	2	...	1
	Totals	33	27	7	9	5	...	17
INDIANA UNIVERSITY.	Firsts	*	*	0	0	0	*	0
	Seconds	...	...	0	0	0	...	0
	Thirds	..	...	2	0	0	..	1
	Totals	...	...	2	0	0	.	1
BUTLER.	Firsts	*	*	0	2	2	*	*
	Seconds	...	..	0	5	2	...	..
	Thirds	...	...	0	4	1	...	..
	totals	...		0	29	17	...	..

*Did not enter.

ATHLETIC DIRECTORS MEET.

A special meeting of the athletic directors was called on Friday noon, Feb 26th, to listen to the report of manager Shaver on field day committees. All directors present excepting Edwards, '99, and Appleton, '00. Mr. Shaver offered the following committees for the approval of the directors: Printing and Advertising, Apparatus, Field, Reception, Entertainment, and Miscellaneous. After some debate and explanations of the duties of these committees, Mr. Shaver's report was accepted. It was decided not to appoint the chairmen of these committees until the following day, in order that the directors might give the matter necessary thought. Manager Pfleging, of the basketball team, reported that a meeting was to be held at the Y. M. C. A. rooms on the following day, to form a city basketball league and he wished to know if he should enter into a schedule of games. He was authorized to enter into a schedule which should be submitted for the approval of Dr. Mees and the directors. The meeting then adjourned to the next day at 12 o'clock. On this day all directors were present. The following men were elected as chairmen of the different committees: Montgomery, '98, printing and advertising; Arn, '97, apparatus; Davis, '99, Field; Mead, '97, reception; Willius, '97, entertainment. These men with Shaver, '97, as chairman and Hellweg, '97, as member ex-officio constitute the executive committee, which will supervise entirely all field day work. After the election of these chairmen the meeting adjourned until the next regular meeting.

The regular meeting of the athletic directors which was postponed on the first Friday in March was held at noon on Tuesday, March 9th, at Dr. Mees' office, with all the directors present, excepting Lansden, '98.

Hubbell, '98, chairman of the committee on the extension of the R privilege, reported that no two members could agree as to any definite action. On motion the committee was discharged and another committee, consisting of Hubbell, '98, Howell, '99, and Pfleging, '00, was appointed by the president to further consider the matter in the light of new suggestions brought forth, and to report at the next regular meeting.

Howell, '99, stated that several members of his class had asked him to speak to the directors in regard to the uniforming of the track team. A committee consisting of Hubbell, '98, Shaver, '97, and Appleton, '00, was appointed to look into the matter.

Manager Shaver proposed the name of Scott,

'98, for the chairmanship of the reception committee for field day, a position left vacant by the death of Mr. Mead. He was elected unanimously.

Manager Hubbell, of the baseball team, asked that an election of baseball captain be authorized to take place soon. A motion was made and carried that the election take place on Saturday morning, March 13, in Mrs. Burton's office, between the hours of 9 and 12, the eligible voters to consist of the regular players and substitutes of last year's team, and that a majority of votes should be necessary for election.

Austin, '98, was elected baseball captain March 13. One ballot.

THE FIRST CONTEST.

A contest consisting of five events was held in the gymnasium on Tuesday evening, March 2. No great preparations had been made for this contest and little or no training had been done. As a consequence but few good records were made. It had been the intention to have a good many freshmen take part, but rumors of a sophomore banquet keep nearly all of them away. The contest was therefore a disappointment considering the number of new men who participated, although some indications were given by a few men of future ability in several events. Six seniors entered the contest, which fact may be considered a remarkable one. The events, with the men who participated, and the records made were as follows:

NOTES AND COMMENTS.

Wabash College defeated Purdue University in a well played game of basketball on February 16th. The score was 23 to 13.

Earlham College holds its local field day on May 1, and its dual meet with Miami College takes place on the Friday following.

Basketball games have been scheduled between Rose and local teams. The Rose team has just been selected, and the men are practicing regularly.

Mons. Pallies writes of the Rugby football in le Petit Marseillais with the enthusiasm of a young convert to the game, which has lately invaded France. He describes the play as a compact melee, with nimble and audacious "halves" (halfbacks). The "long passes" (a fine element of the game unfortunately dropped by us) excited his interest. He speaks of the "vigorous charges" and precise rules, and commends the game as "sedmisant," well adapted to develop the muscles, cultivate quickness of observation, decision and cool headedness. An English game is thus described by a Frenchman. Men everywhere admire a manly sport.—*Ex.*

At the last meeting of the athletic directors the matter of extending the privilege of wearing the R was again taken up and thoroughly discussed. The committee which had been appointed to suggest some new plan could come to no agreement

CONTESTANT.	Shot Put.		Pole Vault.		Potato Race.		Running High Jump.		Standing Broad Jump.		Total Points.
	Record.	Points.	Record.	Points.	Record.	Points.	Record.	Points.	Record.	Points.	
Holliger	30 ft.	48	8 ft.	52	15.3 sec.	34	4 ft. 6 in.	48	9 ft. 1 in.	72	256
McLellan	34 ft. 2 in.	65	7 ft. 3 in.	34	16.2 sec.	16	4 ft. 3 in.	36	9 ft. 10 in.	92	243
Hellweg	29 ft. 6 in.	46	*	..	15.3 sec.	34	5 ft.	72	9 ft. 5 in.	82	224
Chandler	25 ft. 10 in.	32	*	..	15.3 sec.	34	4 ft. 3 in.	36	8 ft. 10 in.	68	170
Shaver.	26 ft. 6 in.	34	7 ft.	28	16.1 sec.	18	3 ft. 9 in.	12	7 ft. 11 in.	48	140
Arn	25 ft. 2 in.	29	6 ft. 6 in.	16	15.8 sec.	24	3 ft. 9 in.	12	8 ft. 2½ in.	53	134
Pierson	20 ft.	8	*	..	15.4 sec.	32	4 ft. 6 in.	48	7 ft. 11 in.	48	134
Moore	25 ft.	28	*	..	15.3 sec.	34	3 ft. 9 in.	12	8 ft. 2 in.	52	126
N. Kidder	*	..	7 ft. 3 in.	34	16.1 sec.	18	4 ft. 10 in.	64	*	..	106
Austin	37 ft. 1 in.	76	*	..	*	..	*	..	*	..	76
S. Kidder	25 ft. 2 in.	29	*	..	*	..	4 ft. 3 in.	36	*	..	65

* Did not take part in this event.

and it was therefore discharged, a new one being appointed to give the matter further consideration. An idea which may be a good one, is to leave the matter just where it stands at present, that is to allow those to wear the R who have won at least one point on some state field day, and if the school teams wish for a recognition of their work, to have them present their request at some meeting of the directors, stating what the insignia should be and to whom it should be granted. This would then throw the matter directly into the hands of those most concerned, for the directors could not refuse to grant such a request made by a school team, and if no further action would de taken in the matter by the directors it would be entirely the fault of the team concerned.

ATHLETIC RECORDS AT POLYTECHNIC INSTITUTES.

The Athletic Association of the Brooklyn Polytechnic Institute, Brooklyn, N. Y., has for over a month past been accumulating data from the prominent Polytechnic institutes over the country, with a view to comparing their records on track and field. As a result of the considerable time and labor which the task must certainly have involved, the February *Polytechnic* prints a complete list of the records made in all events at six institutes, from which list the following summaries of comparisons have been extracted. It is believed that this will be of considerable interest to all of our students, athletically inclined or otherwise, as it clearly shows how we rank with the various institutes.

It will be noticed that Rose takes precedence in the 120-yds. hurdles, one-mile bicycle, two-mile bicycle, standing high jump, standing broad jump, 16-lbs. hammer, and one-mile walk, which being seven events out of seventeen, is a very good record. Rose's records are some of them better than the Indiana State records, for example, the hammer throw, Darst having tossed it further at a local meet than on any Field Day.

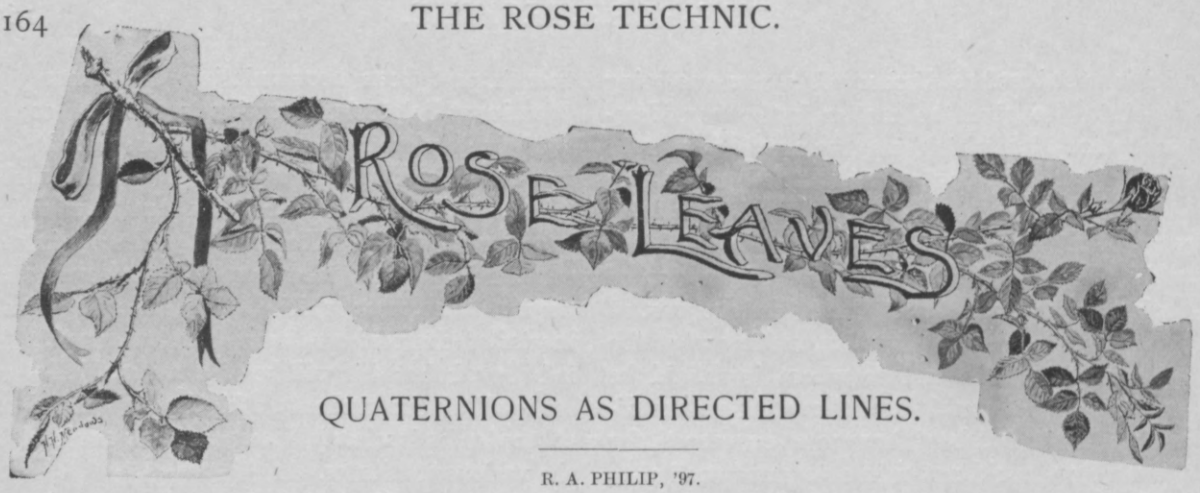
Summary of Comparisons.	100 yard dash.	220 yard dash.	440 yard dash.	Half mile.	One mile.	120 yard hurdle.	220 yard hurdle.	One mile bicycle.	Two mile bicycle.	Running high jump.	Running broad jump.
Mass. I. T.	$10\frac{2}{5}$	23	51	$2.06\frac{2}{5}$	$4.37\frac{4}{5}$	$16\frac{3}{5}$	$26\frac{1}{5}$	. . .	$5.26\frac{4}{5}$	6 ft. $\frac{1}{2}$ in.	22 ft. 1 in.
Stevens I. T.	$10\frac{1}{5}$	$24\frac{1}{5}$	$51\frac{1}{5}$	2.14	5.04	. . .	30	. . .	. . .	5 ft. $3\frac{1}{2}$ in.	20 ft. $5\frac{1}{4}$ in.
Case S. A. S.	$10\frac{1}{5}$	$22\frac{3}{5}$	$55\frac{3}{5}$	2.45	$5.24\frac{4}{5}$	$17\frac{3}{5}$	. . .	$2.42\frac{3}{5}$	$5.25\frac{1}{5}$	5 ft. 3 in.	19 ft. $11\frac{1}{2}$ in.
Rose P. I.	$10\frac{2}{5}$	$23\frac{4}{5}$	53	. . .	5.02	$16\frac{1}{5}$	. . .	1.59	5.12	5 ft. 4 in.	20 ft. 7 in.
Worcester P. I.	$10\frac{1}{5}$	$23\frac{2}{5}$	51	. . .	$4.45\frac{4}{5}$	$16\frac{3}{5}$	28	. . .	. . .	5 ft. $3\frac{1}{2}$ in.	21 ft. 2 in.
Brooklyn P. I.	$10\frac{2}{5}$	$24\frac{2}{5}$	$57\frac{3}{5}$	$2.15\frac{1}{2}$	$5.17\frac{4}{5}$	$16\frac{4}{5}$	$29\frac{3}{5}$	2.47	$5.22\frac{3}{5}$	5 ft. 6 in.	18 ft. 5 in.

Summary of Comparisons.	Standing High Jump.	Standing Broad Jump.	Pole Vault.	16-pound Shot.	16-pound Hammer.	One Mile Walk.
Mass. I. T.	4 ft. 10 in.	10 ft. $1\frac{1}{2}$ in.	10 ft. 7 in.	36 ft. $2\frac{1}{4}$ in.	96 ft. 4 in.	. . . . .
Stevens I. T.	. . . . .	10 ft. $4\frac{1}{2}$ in.	8 ft. 6 in.	34 ft. 2 in.	73 ft. 6 in.	8 m. 43 s.
Case S. A. S.	. . . . .	9 ft. $8\frac{3}{4}$ in.	8 ft. 1 in.	34 ft. $8\frac{1}{2}$ in.	86-87 ft.	. . . . .
Rose P. I.	5 ft.	10 ft. $5\frac{1}{2}$ in.	9 ft. 11 in.	35 ft. 7 in.	115 ft. 9 in.	6 m. $56\frac{4}{5}$ s.
Worcester P. I.	. . . . .	. . . . .	10 ft. 4 in.	36 ft. 5 in.	81 ft. 5 in.	7 m. $37\frac{3}{5}$ s.
Brooklyn P. I.	. . . . .	9 ft. 10 in.	8 ft. 10 in.	31 ft. $1\frac{1}{2}$ in.	62 ft. 10 in.	8 m. $17\frac{3}{5}$ s.

CONFIDENCE RESTORED.

McKinley now sits in the president's chair,
And the capitalists let go their pelf.
We'll soon have money to throw in the air
For e'en the wind is "blowing itself."

N. I. B. Z.



QUATERNIONS AS DIRECTED LINES.

R. A. PHILIP, '97.

One of the greatest difficulties lying at the foundations of the calculus of quaternions is the justification of the use of directed lines as quaternion operators. It may be pointed out here, that the addition, subtraction, resolution, etc., of directed lines is independent of, and in fact, necessarily precedes, the subject of quaternions proper. In this analysis the equations never contain the product of two or more directed lines; they are also homogeneous with respect to the unit of length and independent of any absolute unit of measurement. But when we come to the treatment of directed lines as quaternions, or more usually as vectors only, we are confronted with propositions such as these — the product of two perpendicular lines is a third line perpendicular to the plane of the other two — and, the square of any line of unit length is the number -1. Since these equations give lines and numbers as the product of lines, they are not homogeneous, and require that there should be an absolute unit of length, for, if the foot be assumed as the unit of length, the square of a line a foot long is -1, while if the inch had been taken for the unit the square of the same line would have been -144.

Turning our attention from the difficulties that follow from the use of a directed line as an operator to those showing that it *is* an operator, we find the following solutions. Tait, defining i, j, k as three quadrantal versors whose planes are mutually perpendicular, and $\boldsymbol{i, j, k}$ as three directed lines ("vectors") of unit length perpendicular to these three planes respectively, shows that

$$\begin{cases} i^2 = -1 \\ \boldsymbol{i}^2 = -1 \end{cases} \qquad \begin{cases} i\,j = k \\ i\,\boldsymbol{j} = \boldsymbol{k} \end{cases} \qquad \begin{cases} j\,i = -k \\ j\,\boldsymbol{i} = -\boldsymbol{k} \end{cases}$$

and concludes— "the meanings we have assigned to i, j, k are quite independent of, and not inconsistent with, those assigned to $\boldsymbol{i, j, k}$. And it is superfluous to use two sets of characters when one will suffice." The equation $\boldsymbol{i}^2 = -1$ is not derived from the assumption as to the relations of the lines $\boldsymbol{i, j, k}$ to the vectors i, j, k but rests on an independent assumption that the square of any directed unit line is -1. But if it be granted that the square of a line is a number (and hence a quaternion), it is evident that the line itself may be an operator. Tait supplements this assumption as to the square of a directed line and the product of two perpendicular lines by a curious process of reasoning, derived from Hamilton, to show that no other consistent assumption is possible. Hardy neglects the difficulty entirely, giving the vector the two properties of directed line and quaternion operator by definition. Prof. Hathaway does away with the difficulty by abandoning the idea that a line *is* a quaternion, and substituting for it the idea that the line *represents* the quaternion. This difference is essential, for if a directed line is a quaternion, then we may have the product of several such lines, while if it is only a geometric representation of the operator this result does not necessarily follow. Further, since the length of the line only represents the tensor, nothing is implied as to there being any other than an arbitrary unit of length. As to the propriety of choosing a line arbitrarily to repre-

sent an operator there can be no doubt if the geometric representation is found to be useful.

However, this change only shifts the difficulty, for the question still remains as to what quaternion a given line shall be chosen to represent. A conclusive answer to this question would be found by trying various systems and choosing the most satisfactory. For example, we might let any directed line represent a versor whose plane of rotation was perpendicular to that line and whose angle was equal to the length of the line, and this would permit of further modification according as the unit of angular measurement for the versor was taken as the radian, right angle, or revolution. The number of such possible systems is considerable, so that it may be considered sufficient to arbitrarily adopt one found convenient and consistent in practice. On these grounds a directed line is taken to represent that quaternion whose plane is perpendicular to the line, whose angle is a right angle and whose tensor is equal to the length of the line. From this assumption it may be shown that the sum or difference of two vectors is represented by a line which is the sum or difference of the two representative lines—that the quaternion which multiplies one vector to produce a second is the same as that which operating on the representative line of the first, produces the representative line of the second. The remarkable character of these and other results obtained by this method are only equaled by the artificial character of the assumption from which they follow. This will appear more evident from a comparison of this representation used in the vector analysis with another mode of representation resting on a different basis, and which may well be called the natural method.

Reverting to the definition of a quaternion, we find it to be that operator which changes one directed line to another by altering the length in a given ratio, and rotating it through a definite angle in a certain plane. Our natural representation follows immediately from the definition in this way—since a quaternion is an operator whose office is to change one directed line to another, let us represent any quaternion by choosing (arbitrarily) some definite line as a unit line or base, operating on it by that quaternion and taking the resultant as the representative line. From this we may derive results that are parallel to those of the vector analysis. The sum or difference of two quaternions is represented by a line which is the sum or difference of the two representative lines—that quaternion which multiplies another to produce a third is the same as that which operating on the representative line of the second produces that of the third. In comparing the two systems of representation there is one difference worthy of especial notice. In the vector analysis every line represents a vector, thus giving the homogeneous character to the treatment of the different directions in space which was Hamilton's aim. This makes it an eminently proper mode of representation for applying quaternion operators to geometrical problems. On the other hand the natural method makes lines represent quaternions whose angles are different as well as their tensors. This leads to a heterogeneous treatment of the different directions in space, making it on this account a method more powerful when used for the converse purpose of using geometry in the study of quaternion operators.

Considering now the symbolic expression of a quarternion as a fraction, the denominator denoting the line operated upon, and the numerator the line produced by the operation, we see that if we assume one definite and constant base line, then the denominators of all the quaternion fractions will be the same. Since the denominators are all alike we may agree to suppress them all, and then $q=\frac{OB}{OA}$ becomes $q=OB$ in which the line OA which is the base of comparison does not explicitly appear. Thus we arrive again at the apparent identity of an operator with a line. We may now carry this process a step further by assuming that all the representatives lines shall be drawn from a single definite point as origin. Now, since the initial points of all the lines are coincident, we may suppress the symbols for them, denoting each line by its terminal point

alone. Thus $q=OB$ becomes $q=B$, and the operator is designated by a point. If now we confine ourselves to the representation of coplanar quaternions by the point method it appears that we have what is known as Argand's diagram for the representation of the complex numbers of algebra.

Returning now to the line representation of quaternions the question presents itself that if we are to represent every quaternion by operating with it on the given base line, how can we represent one to whose plane the base line is inclined? Since the versor factor of the quaternion requires that the line should rotate in a plane in which it does not lie, we conclude that the operation is impossible and that there is no representative line. As in the vector analysis only the vectors find geometric representation, so in this those quaternions whose planes of rotation pass through the arbitrarily chosen base line alone have representative lines. This lack of universality of power of operation leads to a curious result. Assuming three equations $p\ OA=OB$, $q\ OB=OC$, $r\ OA=OC$ the two results $qp\ OA=OC$ and $qp=r$ follow. If now we take a line OD in the plane of r but not in the plane of p we may operate on it by r and get another line OE also in the plane of r but not in the plane of q. Taking the equation $r\ OD=OE$ and substituting for r we have $qp\ OD=OE$ or $q\ (p\ OD)=OE$. But the line OD is not in the plane of p so that the operation $p\ OD$ appears to be impossible. Thus we have the operation qp impossible of performance when considered as two successive operations but possible when considered as two simultaneous operations.

I shall now by means of an extension of the power of operation of a quaternion, first make any quaternion an operator on all lines and by this means interpret the equation $qp\ OD=OE$, and second give to every quaternion a representative line and from this show that the representation of vectors in the vector analysis is merely a consequence of the natural method in which it is included.

The extended powers which I purpose to give the quaternions require for their exercise space of four dimensions. So I will assume that from any point four mutually perpendicular lines may be drawn, and that the space defined by any three mutually perpendicular lines has the same properties as ordinary space. Letting OW, OX, OY, OZ be four mutually perpendicular lines, it follows obviously from two preceding postulates that any line from O in the plane of any two of these lines is perpendicular to any other line from O in the plane of the other two. Two planes which are related in this manner I shall call "right-angled" planes to distinguish them from planes that are at right angles in the ordinary sense. Some evident properties of right-angled planes are, — first, the locus of all lines perpendicular to a given plane at a given point is a right-angled plane; second, any line may be resolved into two components, one in each of two given right-angled planes, in one and only one way, and if the line lies wholly in one plane the component in the other vanishes.

The properties of right-angled planes just mentioned are sufficient to suggest the required extension of definition, which is—a quaternion is an operator which alters the length of a directed line in a given ratio and rotates it through a definite angle in a given plane *or through the same angle in a corresponding direction in the right-angled plane.* Correspondence of rotation in right-angled planes being determined by a convention. This extended definition includes the old definition without conflicting with it, for if a quaternion under its restricted definition can operate on a given line, then that line lies entirely in one of the planes, and having no component in the other the new power of the generalized quaternion remains quiescent. It also follows that a quaternion may operate on any line for it is only necessary to resolve the line into two components, one in each rotational plane. And as these components are at right angles both before and after the operation it appears that a versor can not alter length in any case.

In the equation $qp\ OD=OE$ it is now evidently possible to perform the operation qp on OD for

resolving OD into its two components OF and OG in the two rotational planes of p we may operate on these separately by p. Letting $p\ OF=OH$, $p\ OG=OI$ and $OH+OI=OJ$ we may resolve OJ into its two components OL and OM in the two rotational planes of q. We may now operate on OL and OM separately by q. Letting $q\ OL=ON$, $q\ OM=OP$ and $ON+OP=OQ$ we have $qp\ OD=OQ$. It now remains to be shown that OQ coincides with OE. Since $T\,qp=T\,r$ the length of OQ is equal to the length of OE. To show that the direction of OQ is the same as that of OE requires the application of the formulæ of spherical trigonometry to the determination of the magnitudes of the components of OQ, as this process is somewhat long it will be omitted.

Taking now and line OW for a base line, we have since any quaternion may operate on any line, a representative line for every quaternion, and since any two lines define a plane, angle, and tensor, we have conversely, a quaternion represented by every line. If h be any vector and $h\ OW=OV$ then OV being in one of the planes of rotation of h is perpendicular to the other and also as h is a vector it is at right angles to OW. The length of OV compared to OW as the unit of length will be $T\,h$. The locus of all planes perpendicular to OW is the same space of three dimensions as the locus of all lines perpendicular to OW so that if we retain OW as a base line but fix our attention only on the space of three dimensions at right angles to it we find that *every directed line represents a vector whose plane is perpendicular to that line and whose tensor is the length of the line.* Thus, then is the representation used in the vector analysis a necessary result of the natural representation when the power of operation is extended so that any quaternion may operate on any line.

With regard to the separation of the operation of a quaternion into rotations in two right-angled planes and the corresponding resolution of the line to be operated upon into components in these planes it is only necessary to remark that the method is used rather as a convenience than as a necessity. The operation may be regarded as a simultaneous rotation of the line as a whole about two right-angled planes.

A WISE ACT OF LEGISLATION.

[An essay prepared for the Sophomore literature class.]

One fine summer day a dozen Junes ago, a city gentleman, something of a politician in the town of ———, Illinois, started with his wife for a buggy-drive into the country. The atmosphere of the day was filled with the sweet fragrance of blossoming wild flowers, pastures of clover just heading out made beautiful living mats of pink and green covering for the earth. The dirt road had been dry for about ten days and so was in splendid shape for smooth and easy traveling. The spring lambs in flocks along the roadside bleated a merry bass for the tenor of the hundreds of little chickens that followed the busy biddies of the country. Cherry trees were in full fruit and mirrored in the air the beds of ripe red strawberries below. A sparkling spring pouring forth fresh water for the already occasional call of the bull frog was the finishing touch of the picture of joy, happiness and comfort that appeared to the meditating lawyer.

Six months later this same busy lawyer needed to visit a client out in this same country; this time he did not take his wife with him, nor did he make his trip in a buggy; a stout riding horse for locomotion and high rubber boots for protection to himself were the essentials of this journey into the country. Why such a change? The lawyer's ideal smooth elastic dirt road of June had changed to a canal of mud, belly-deep for the poor horse.

His client, a farmer, had his barns filled with hundreds of bushels of wheat and corn, and his stables were filled with well-fatted sheep and hogs. How could it happen that this farmer, his ideal of manhood and independence, should be so down-spirited and so lacking in welcome for his friend the politician? This is the reply the farmer made to the lawyer's questions: "Last September my wheat was worth but fifty cents per bushel and now it will bring ninety cents per bushel in the market, but it has been three

weeks since I could pull a load over these roads with a single team, and my market, while offering nearly double inducements, has virtually moved away from me three-fold. The roads are in such shape that my boys and girls can not now attend the winter district school and must remain at home. Our cellar is full, but our coal shed is nearly empty. I have many leisure days now in which I would like to repair my machinery, but fate is against me for I can not reach the blacksmith. My wife loves the farm and is contented, but she sorely misses the occasional social visits with other women."

The farmer had not seen a newspaper for three weeks so he asked the lawyer what they had been doing in the legislature and in congress. The lawyer told the farmer about the new tariff on wood, the appropriations for new railroads and steamships that the American producer might compete in all markets of the world; about the new law abolishing prison labor which competed with honest labor, and about the tax that had been levied to support a new prison to relieve the present overfull prisons. Then the lawyer politician wanted to know if the farmer did not think that he had been well provided for by these measures.

The farmer agreed that legislation had opened up the markets of the world to commission men and to warehousemen on all the railroads; but, said he: "How can the railroads help me when I can't reach the railroads, nor ships, nor wool buyer, nor miller? And must I work hard all summer raising food and then have to send some of that food to the idle worthless criminal at the state's prison? Now, make these lazy outlaws open up my roads in return for their provision and you will open up the markets of the world, open up schools and society, bring the coal mine to my door, and make the farm the most beloved and independent spot on earth.

The lawyer made his way through the mud back to town and returned to his law making. He succeeded in establishing an experimental commission providing for road building by prison labor as roughly pictured by the farmer. The next spring gangs of fettered men were to be seen along our familiar country road, making steady progress on a substantial, brick, graded pavement; the government had little additional expense; and the prisoners, brought from dark and sullen idleness to sunshine and cheer in contact with nature, were made better and happier men.

The lawyer's experiment proved a success and the practice of using prison labor for country road building is now spreading rapidly. The farmer's words were correct, for at the present writing (A. D. 1910) the farm is the home of the happiest and most independent man on earth, and he enjoys the full benefit of commercial and social intercourse.

A. D. KIDDER, '99.

THESIS SUBJECTS.

1. Study of the Frictions of Journals in various boxes and bearings under different conditions by means of Gray's Journal Testing Machine.
   HERMAN S. HEICHERT.
   EDMUND FRANK.
2. Test of Commercial Insulating Materials for Resistance and Breaking-down.
   MAURICE C. RYPINSKI.
   AUGUST H. MEYER.
3. The Generation of Electricity Directly from Carbon.
   JOHN H. HELLWEG, JR.
   JAY H. HALL.
4. A Test and Study of Worthington Fire Pump, Rose Polytechnic Institute.
   HERBERT C. WESTFALL.
   CLARENCE H. TUCKER.
5. Design for an Automatic Soap Wrapping Machine.
   THEODORE L. CAMP.
6. Design for an Electric Street Railway Plant.
   JOHN E. LUFKIN, JR.
   ODUS B. MOORE.
7. The Effect of Annealing and Tempering on Magnetic Hysteresis.
   ARCHIE G. SHAVER.
8. History and Development of the Application of the Theory of Imaginary Quantities to Dynamical Problems.
   J. HENRY LENDI.
9. Designs for a Water Works and Sewerage System, Spencer, Indiana.
   WILLIAM G. ARN.
   T. GUY PIERSON.

10. A Comparative Test of Certain Alabama Coals Under Locomotive Boilers. South and North Alabama Division of the L. & N. R. R.
ROGER M. NEWBOLD.
ARTHUR F. GORDON.

11. Plans and Specifications for a City Arc Lighting Plant.
CHAS. H. FRY, JR.
GUSTAV WILLIUS, JR.

12. The Shearing Strength of Timber.
CHAUNCEY H. HOLDERMAN.
WALTER H. MARTIN.

13. Review of Literature and Present State of Knowledge in Reference to Molecular Forces in Surface Tension.
ROBERT A. PHILIP.

14. Investigation of the Change in Electrical Resistance of Conductors in a Magnetic Field.
BENJ. F. CHANDLER.

15. A Comparison of Dams Constructed in the Past.
J. DAVID INGLE.

16. Synthesis of Camphoric Acid from the Hydrobromide of the Cis Campholytic Acid.
JOHN J. KESSLER, JR.

17. Study of the Laws of Magnetic Pull in an Electro Magnet.
J. BRIGGS HANEY.

The following is a list of thesis subjects discovered at the Institute recently which was probably rejected by the faculty:

The Application of the Human Voice to the Sharpening of Skates . . . . . ARN.

Efficiency of a Bluff . . . . . CAMP.

Efficiency Test of a Slide Rule and Its Application to the Translation of Mangoldt's Volkswirthschaftslehre . . . . . CHANDLER.

Various Methods of Soft-Soaping a Professor . . . . . HEICHERT, FRANK.

Methods of Overcoming the Inconveniences Due to Doubles . . . . . FRY.

Determination of the Missing Link . . . MONK GORDON.

Various Applications of the Art of Soldiering . . . . . LUFKIN, MARTIN.

Relative Efficiencies of Milwaukee and Terre Haute Beer . . . . . MEYER.

The Extreme Limit of the Number of Inflexions to Be Given to the Human Voice . . HOLDERMAN, MOORE.

Experiment to Determine the Least Number of Hours a Person Must Sleep in order to Exist . . . HANEY.

Determination of the Temperature in the Upper Strata of the Atmosphere . . . . . PIERSON.

Application of Compressed Air to the Working of Pipe Lines . . . . . WILLIUS.

Per cent. of Confidence to be Placed in the Expression, "THE TECHNIC will be Out To-morrow" . . . . . HALL, HELLWEG.

Disadvantages Accruing from the Use of Mush in the Mouth . . . . . INGLE, WESTFALL.

The Ultimate Analysis of a Sweater . . . . . KESSLER.

Design of an Automatic Reversible Banana Stand . . . . . LENDI.

Application of the Bi-quadritangential Multiharmonium Analysis to a Hieronymous . . . . . PHILIP.

The History, and Investigation Leading to the Solution of the existing Race War . . . . . NEWBOLD.

Improvement of the Pedestrinometer . . . . . SHAVER.

The Determination of the Length of Time a "Disappearing Carriage" can be seen in Case of a Runaway . . . . . TUCKER.

Design of a Camera Which Will Take Two or More Pictures on the Same Plate . . . . . RYPINSKI.

THE FACULTY RECEPTION.

On the evening of the twentieth of February the students were handsomely entertained at a reception given by the faculty in the gymnasium, which had been decorated for the occasion. The guests began to arrive a little after eight and were smilingly received at the entrance by Dr. Mees, while on the inside were the other members of the faculty accompanied by their wives. The larger part of the students gladly availed themselves of the opportunity of becoming acquainted with some of the residnts of the city, and although the threatening weather prevented quite a number from attending, every one seemed well pleased and enjoyed themselves very much. About ten o'clock the floor was cleared and the Ringgold orchestra began to play dance music, in the place of the more classical numbers with which they had been entertaining those present during the earlier part of the evening, meanwhile refreshments were being served upstairs.

The music ceased at half past eleven, in time for every one to catch the street cars which were waiting outside.

The reception was greatly enjoyed, and quite a number were heard to express the hope that they might have an opportunity to attend another one before very long.

THE SOPHOMORE BANQUET.

Wednesday, the third of March, saw the bulletin board adorned with a poster which represented a herald of "ye olden tyme" pealing forth the following proclamation:

Come one! come all!
To ye Sophomore feast;
Our Freshman friends
Be not the least!

This notice was posted at ten o'clock, and of course the Freshmen immediately discovered its presence, and at noon held a class meeting. After some parley it was decided to "cut" recitations in the afternoon and secure a Sophomore in some manner. The '99 men took the precaution to dine together at the Union Station, and then divided into squads so as to give each one an opportunity to put on his banquet clothes. This was safely accomplished, and they were all at school again by two o'clock. At five o'clock they started for the Terre Haute House, where the banquet was to be held, passing the Freshmen on the way. Things looked "squally" for a few moments, but '00 decided that it would be useless to attempt to interfere, and '99 went on unmolested arriving at the hotel about half past five, where they retired to their rooms on the fourth floor and proceeded to amuse themselves in various ways until the hour of the banquet. About five minutes of eight three of the Sophomores grew restless and ventured down stairs to see how soon the banquet would be ready. This was what the Freshmen were waiting for, and in a twinkling they rushed in, siezed Nat Burt and hurried him out to the carriage which they had waiting for just such an emergency. The cries for help by Edwards and Schwable, who had accompanied him down stairs, soon brought the rest of '99 to the rescue, and their arrival put a speedy end to the "scrap" which the Juniors and Seniors were enjoying hugely. Unfortunately a policeman arrived just at this instant and siezed Trumbo, who was busily engaged with one of the Freshmen. The policeman, however, offered to do the fair thing in the matter, and left it to Mr. Baur to decide whether he should release his captive or not, and Mr. Baur, for some unaccountable reason, not only refused to request his release but insisted that he be "run in," as he called it.

This action of Mr. Baur's so ruffled the Sophomore's that they immediately declared the banquet off and marched down the street in a body after their classmate, and when they once more had him among them they repaired to Sage's restaurant where they held their banquet and if their *menu* was not so varied as it would have been at the Terre Haute House, it was thoroughly enjoyed by all.

Mr. Kidder was toastmaster and the toasts were responded to as follows:

Address	President Stone
Our Class	J. J. McLellan
The Faculty	J. T. Schwed
"Fresh Snipe"	F. J. Jumper
Tech and Tech	F. G. Atkins
„Burdehüider Einsiedler„	H. G. Kittredge
„Prächtige Jungfrauen„	H. C. Schwable
À la Theatre Comique	C. B. Smythe
Class Prophecy	E. P. Edwards

INDIANA COLLEGE PRESS ASSOCIATION.

The annual meeting of the Indiana College Press Association was held February 19th at Purdue University, Layfayette, Ind. All the colleges were represented with the exception of Wabash and DePauw, who failed to send delegates. Before the business meeting proper, a short literary program was given by the different delegates, which consisted of papers upon different phases of college journalism. The following subjects were discussed:

The Difficulties Met With in the Business Department of a College Paper . . . Mr. Finnay, Purdue
The Purpose and Scope of Editorial Work. . . . . Miss Mary Sleeth, Earlham
How to Build Up the Interest in a College Paper by the Student Body . . . Miss Christian, Butler
How to Increase Interest in the Literary Contributions . . . Mr. W. A. Reed, Indiana University
The Relations of the College Papers of the State to One Another . . . . . Mr. J. J. Kessler, Rose
The Future of the Association . . . . . Mr. W. S. Greeson, Purdue

A short informal reception was given the delegates at the close of the literary program, after which the business meeting was held. The meet-

ing was presided over by Mrs. Wm. Jones, Editor of the *Exponent* and vice president of the Association. Miss Jennie L. Christian of the *Butler Collegian* acted as secretary.

The officers chosen for next year are as follows:

President—*Purdue Exponent.*

Vice-president—ROSE TECHNIC.

Secretary and treasurer—*Earlhamite.*

Executive committee—{ *DePauw Weekly.* / *Indiana Student.*

The place of meeting for next year will be chosen by the executive committee.

Both Earlham and Indiana University have offered to entertain the convention. The *Earlhamite*, holding the office of secretary, is the official organ of the Association.

KESSLER, '97.

ROSE SCIENTIFIC SOCIETY.

The second meeting of the Rose Scientific Society occurred Friday evening, February 29, in the Physical Lecture Room. The time for the regular meeting was February 19, but, on account of the use of lecture room apparatus at the lecture given by Dr. Mees at the Normal Hall, the meeting was postponed for a week. The president called the meeting to order promptly at 7:30, a large number being present. The minutes of the previous meeting were read, and as no other important business came up, the program for the evening followed.

Mr. Willius read a very interesting paper on "The Uses of Compressed Air," illustrating the manner of its application in many cases by lantern views.

Mr. Newbold's treatment of "Methods of Compounding Locomotives" was closely followed by those present. He showed with moving diagrams how the compounding is effected in different systems, and developed formulæ applying to theoretical indicator diagrams.

A short discussion followed, after which the meeting adjourned.

At the next meeting, Friday, March 19, the following papers will be presented:

Counterbalancing of Locomotives . . . . Stewart, '98.
On the Theory of Solutions . . . . . Kessler, '97.

RESOLUTIONS OF CONDOLENCE.

At a general assembly of all the students called on March 4th, the following resolutions were passed:

We, the students of the Rose Polytechnic Institute, feeling the loss of our fellow-student, Samuel Gilmore Mead, and wishing to express the deep regard which we, as his associates, feel for him, extend to the bereaved family our sincere sympathy. COMMITTEE.

RESOLUTIONS OF CONDOLENCE CLASS OF '97 R. P. I.

The class of '97 of Rose Polytechnic Institute learns with deepest sorrow of the death of its member, Samuel Gilmore Mead, and wishes to tender this tribute to his worth and manly character.

His fidelity to his class and his loyalty as a friend will cause his memory long to be cherished.

To the bereaved family we express our sincerest sympathy. COMMITTEE.

TELEGRAPH SPARKS.

The line has been kept working very well for the last month.

Prof. Peddle has been unable to "cut in" on account of not being able to get an instrument. The line is in his room at the Institute, however.

Witherspoon, '00, was put in a few days ago.

Meriwether, '00, seems to be learning faster than any of the new members lately "cut in."

The company is out of debt and has a small surplus. It will be a comparatively easy matter to keep the finances in good shape if all members pay their dues promptly.

THE CAUSE.

He loved a girl with auburn hair,
When asked what caused his action,
He said he guessed the foremost cause
Was capillary attraction.—*Ex.*

THE TECHNIC board had its picture taken recently.

Only a few more days of grace left before examination.

Hubbell, '98, was laid up with a boil upon his leg, the other day.

Freudenreich, '98, was elected captain of the school basketball team.

A Normalite's definition of a cigarette: "A reverie-breeding narcotic."

The Spanish class is now reading "Pepita Jiménez," a novel by Valera.

"Professor Place looks quite old to-day."

Martin—"Yes, he is an ancestor now."

A Sophomore asks if the water of crystallization that is obtained from copper sulphate is blue.

When are the Sophs going to have their banquet? We are waiting anxiously to hear of it.

Hellweg, '97, had the misfortune to wrench his ankle while at work in the gymnasium last week.

A gavel made by Fletcher, '98 is being used by the Speaker of the House in the Arkansas Legislature.

Parson Davis has been seen twice recently wearing a white shirt and a standing collar. Will wonders never cease?

McLellan, '99, sprained his ankle severely while hurrying to the assistance of his classmates on the night of the banquet.

Hose pipe was used on the night of the banquet in its proper capacity, which is not, as Rose students know, to conduct water.

Dr. E. J. Goodwin, of Posey county, the "mathematical genius," visited the Institute last week. He was the guest of Martin, '97.

Freshman York, although he has served in all capacities as an artilleryman, is visibly frightened when Dr. Noyes' hydrogen gun is fired.

Meyer, '97.—"The secondary cylinder in a compound engine is used as a condenser for the primary in order to reduce back pressure."

Davis, '99, is mourning the loss of his piece of hose pipe which he gave to a bystander upon the appearance of the policeman the other night.

Jakey, to policeman who is clutching his arm hard enough to leave the marks of his fingers upon it, "Just turn me loose will you? I'll stand without hitching."

Prof. W—"I know some people who have become regular fools about learning languages. I was afraid once that I would become one of that kind of fools myself."

Freshman (reading aloud)—"Man proposes, woman accepts."

Senior (waking suddenly)—"Not always."

Can it be from experience?

The Senior Civils are at present getting all the water they can dispose of. Instructions in hydraulics strike them in four different departments. Brain matter is still intact.

The carbonic acid machine donated to the Institute by Mr. Jacob Baur has been received. It is being prepared for experimental work and will be used to furnish ice for the Institute this summer.

Harris—"Here, Hellweg, is a job for you—no, I think I will put some one else on it."

Hellweg—"Why, aren't you in a hurry for it?"

Harris—"Yes; that's just why I thought you wouldn't do."

Prof. Place—"Now gentlemen, we have here a

number of ten-and-a-half pound weights, but"—examining them—"they seem to be principally five-and-a-half pounds. We will use two of them for a ten-and-a-half."

The new fan motor designed by Professor Wagner has been completed by the shop force, and is doing its work very satisfactorily. An automatic device for starting the motor has been added which works perfectly.

President Mees (seeing Trumbo eating an apple in the hall):

"Trumbo, what are you going to do with that core?"

Jakey—"They ain't goin' a be no core."

Several Seniors were discussing one of the dynamos at the shop which was sparking considerably at the brushes. Lufkin (putting his fingers on the commutator). "No wonder the machine sparks, just feel how hot the commutator is!"

A few of the boys seized the opportunity offered by Washington's birthday coming on Monday, to spend Sunday and Monday at their homes. Among them were Kittredge, '99, Hall, '97, Wiley, '98 and Newbold, '97. Willius, '97 accompanied Newbold.

One of the Seniors suggests that the ice machine just received ought to be run by the steam engine being built in the shops. As the latter is a reversing engine the operation of the ice machine might likewise be reversed when required, and the machine allowed to generate heat during the colder months.

The Seniors have an examination at the end of this term as usual, in all subjects but laboratory work. The degree examination covering the four years' work will be May 3–8. Thesis work begins May 10th and extends throughout the rest of the spring term. Theses are to be handed in, typewritten, June 12th, the thesis examinations being June 14th.

Ingle entered the room where the Sophomores were reciting descriptive geometry the other day, with a basket containing a number of blocks of cement to be tested. He was busily engaged with one of them when attracted by the decreased weight of the basket, he examined it only to discover that there remained three of the original blocks. After ten minutes search, with the assistance of Professor Peddle, he was able to depart with all but one or two of the missing ones.

Kidder, '99, to Keyes, '99, (who has a new bottle of ink).

"Say, Keyes, my bottle is nearly empty, let me pour what is left in mine into yours, so that I can dip it out easier.

Keyes—"All right." (Kidder pours out about a teaspoonful and overflows Keyes' bottle). Hey! you stop that."

Kidder—"Sorry, Keyes. I'll pour it back."

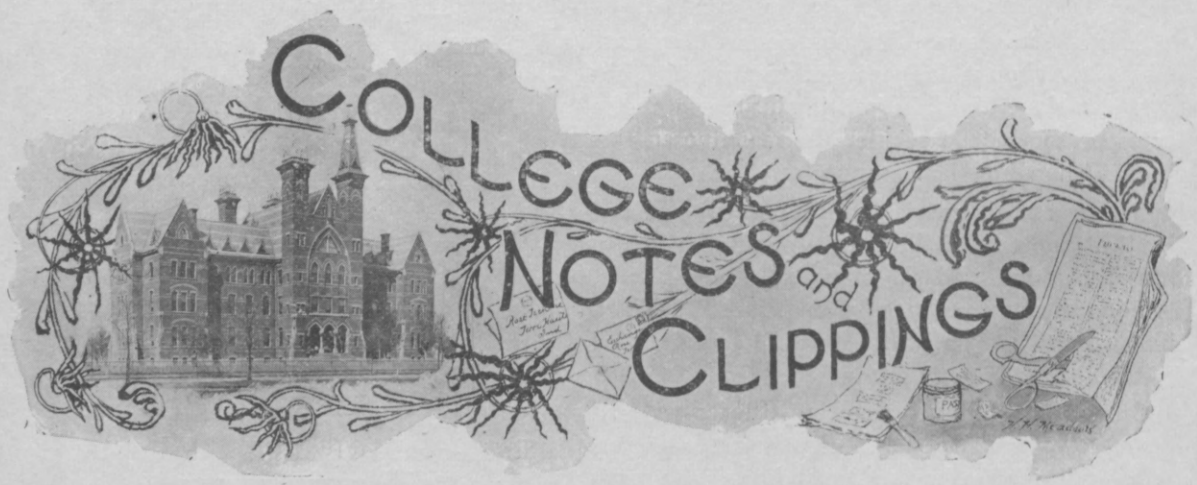
Kidder now has enough ink to last some time and Keyes' bottle is half empty.

Prof. McC. (In mathematics)—"Some of the stars that disappeared 2000 years ago still shine, so far as we are concerned, for the distance is so great that the last rays have not yet reached us."

Appleton—"And, Prof., some say that the moon is extinct but the light is still coming," (Hanley laughs) "There may be some people, Hanley, who know more about it than you do."

Hanley, (fiercely)—"Well, I hope there are some who know more about it than you."

Prof.—"Hanley!" (Class dismissed.)



The first census of Russia is now being taken.

All of Harvard's baseball team of last year are back in college.

The Carlisle Indians will put a baseball team in the field this year.

Fourteen new men are trying for the position of pitcher at Harvard.

There are twenty-eight candidates for battery positions on the Yale team.

Harvard has 293 professors, instructors and tutors—169 more than Yale.

The inter-class baseball games at the University of California have just been finished.

Cornell has abolished all degrees in academic courses except that of bachelor of arts.

Twenty-six American women have matriculated for the new term of the University of Berlin.

Thirty-one candidates are competing for the bicycle team which will represent Yale this spring.

Representatives of ninety-nine different colleges are now taking post graduate courses at Yale.

Calcutta, India, has twenty colleges with 3,000 students, and forty high schools with 2,000 students.

The trustees of Cornell University have decided to establish a college of architecture, offering a degree of Bachelor of Architecture at the end of a four years' course, a degree not hitherto conferred in America.—*Ex.*

There are eleven daily newspapers in China, nine printed in Chinese, one in English and one in French.

The third team of American Cricketers to play in foreign lands will leave for England, Wednesday, May 26th.

There are 246 Yale men holding professorships in American colleges. Thirty-four of these have positions at Yale.

When Stanford University receives its final share of the Stanford estate it will be three times as rich as Harvard.

There are 254 candidates for the Mott Haven athletic team at Harvard, 91 of them being for the sprints and quarter-mile run.

Harvard's latest athletic wonder is L. C. Rood, who lifts a 205-pound dumbbell and raises it with one hand above his shoulder.

The Kansas College Presidents' Association have, without a dissenting vote, adopted resolutions condemning football.—*The Student.*

The faculty of Princeton have adopted a rule whereby any student who is dropped in term examinations is debarred from participation in athletics for one year.

President Eliot recommends to Harvard students to study ten hours, sleep eight, exercise two, leaving four hours for meals and social duties.

The appropriation of the New York School Board for the year 1897 is $6,000,000. This provides for the instruction of 200,000 pupils by 4800 teachers.

He went away to college,
A sheep-skin was his quest,
But the chase for it was bootless,
As a pig-skin pleased him best.—*Ex.*

Ohio is educating more students than any state in the Union. There are at present 16,000 young men and 8,000 young women in her numerous colleges.—*Wooster Voice.*

More than half of the total number of graduates of Johns Hopkins have become teachers, the majority occupying important chairs in the colleges and universities of America.

The editor-in-chief of the college paper published by the students of the State University of Ohio, has been expelled from that institution because of an editorial censuring the members of the faculty for non-attendance at chapel exercises.—*Ex.*

MY SWEETHEART.

I put my arms around her waist,
Her head upon my shoulder,
I see a love look in her eyes,
I kiss her, growing bolder.

I smooth her hair with tenderness,
I swear to her true to be,
And then I softly whisper,
"Dear Ma, lend me a V."—*Ex.*