

HAND-BOOK

OF THE

Kansas State Agricultural College,

MANHATTAN, KANSAS.



MANHATTAN, KANSAS:

PRINTED AT THE OFFICE OF THE NATIONALIST:

1874.

SPECIAL COLLECTIONS

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Since the names of the Board of Regents were printed, JOHN H. FOLKS, of Wellington, Sumner County, has been appointed to succeed CHAS. E. BATES, whose term had expired, and N. A. ADAMS has been elected Secretary, vice Wm. Burgoyne, resigned.

ERRATA:—To Faculty, add name of W. C. STEWART, Superintendent Telegraph Department.

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BOARD OF REGENTS.

J. K. HUDSON.....Topeka, Shawnee Co.
 N. A. ADAMS.....Manhattan, Riley Co.
 JAMES ROGERS.....Burlingame, Osage Co.
 B. L. KINGSBURY.....Burlington, Coffey Co.
 JOSIAH COPLEY.....Perryville, Jefferson Co.
 CHARLES E. BATES.....Marysville, Marshall Co.
 J. A. ANDERSON.....Manhattan, Riley Co.

WM. BURGOYNE, *Secretary*.....Manhattan, Riley Co.
 E. B. PURCELL, *Treasurer*.....Manhattan, Riley Co.
 E. GALE, *Loan Commissioner*.....Manhattan, Riley Co.
 L. R. ELLIOTT, *Land Agent*.....Manhattan, Riley Co.

FACULTY.

J. A. ANDERSON, President and Prof. Political Economy.
 J. H. LEE, Prof. English and History.
 M. L. WARD, Prof. Mathematics.
 J. S. WHITMAN, Prof. Botany Entomology and Geology.
 WM. K. KEDZIE, Prof. Chemistry and Physics.
 E. M. SHELTON, Prof. Practical Agriculture and Supt. of the Farm.
 E. GALE, Prof. Horticulture and Supt. of the Nursery.
 J. E. PLATT, Prof. Elementary English and Mathematics.
 MRS. H. V. WERDEN, Teacher of Instrumental Music.
 A. TODD, Supt. Mechanical Department.
 MRS. H. C. CHESELDINE, Supt. Sewing Department.
 A. A. STEWART, Supt. Printing Department.

EXPLANATORY.

Radical changes have been made in the KANSAS STATE AGRICULTURAL COLLEGE since the publication of the last catalogue. As a State Institution it is morally bound to place before the people, as well as in the hands of the Legislature, full information respecting the nature, and, so far as developed, the results of these changes. The close of the collegiate year affords the first fitting opportunity for so doing. Accordingly, the design of the following pages is to set forth the more important facts in regard to the existing management, objects, and methods of the College, together with statements of the work actually performed in its several departments during the past year; thus presenting a view of the Institution as a whole, as well as of the facilities which it offers to those who desire a liberal and practical education.

This pamphlet is a hand-book of the College, rather than a mere catalogue; and is intended to answer the many different enquiries, respecting wholly dissimilar matters, which are constantly received. It is not expected that all the subjects treated will be of equal interest, or, for that matter, of any interest to the same person. Hence each is presented somewhat fully, and the table of contents will enable the reader to turn at once to the subject concerning which he desires information.

MANAGEMENT.

In accordance with an act of the Legislature reconstructing the Boards of the several State Institutions, approved March 6, 1873, Governor Thomas A. Osborn appointed the following gentlemen as Regents of the Kansas State Agricultural College, who entered office April 1, 1873.

<i>Name.</i>	<i>Post Office Address.</i>	<i>Term Expires.</i>
JAMES ROGERS.....	Burlington, Osage Co.....	April 1, 1876
CHARLES REYNOLDS.....	Fort Riley, Davis Co.....	April 1, 1876
N. A. ADAMS.....	Manhattan, Riley Co.....	April 1, 1875
J. K. HUDSON.....	Wyandotte, Wyandotte Co.....	April 1, 1875
JOSIAH COPLEY.....	Perryville, Jefferson Co.....	April 1, 1874
N. GREEN.....	Holton, Jackson Co.....	April 1, 1874

During the summer of 1873, the Board filled the vacancies created by the resignation of the Rev. Joseph Denison, D. D., as President, and of the Hon. Isaac T. Goodnow, as Land Commissioner, by the election of John A. Anderson and L. R. Elliott. It also established three additional Professorships, namely: Botany and Entomology, Prof. J. S. Whitman; Chemistry and Physics, Prof. Wm. K. Kedzie; Mathematics, Prof. M. L. Ward.

Early in 1874, Regents Green and Reynolds, on account of the pressure of private duties, reluctantly tendered their resignations; and the Governor appointed in their places Charles E. Bates, Marysville, Marshall Co., and B. L. Kingsbury, Burlington, Coffey Co.

Prof. E. M. Shelton accepted the chair of Practical Agriculture, April 1, 1874—Prof. E. Gale having temporarily discharged the duties thereof subsequent to February 7th, 1874, at which date it became vacant.

Policy of the Regents.

In its first Annual Report the Board issued the following explicit statement of the principles which would control its action in the management of the Institution:

In the outset we endeavored to obtain a clear idea of the object sought to be accomplished by the creation and maintenance of Agricultural Colleges.

The fundamental law governing these institutions is an act of Congress entitled "An act donating lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," approved July 2, 1862. The fourth section requires that the interest of all moneys derived from the sale of the lands donated "shall be inviolably appropriated by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes, in the several pursuits and professions in life."

By transposing the clauses, and omitting those which prescribe the mean by which the object is to be gained, rather than the object itself, the section may be fairly stated, thus: "In order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life, each State" accepting this grant "shall maintain a college where the leading object shall be to teach such branches of learning as are related to agriculture and the mechanic arts."

Without detailing the steps by which we have reached our conclusions, suffice it to say that we are unanimously agreed upon the following points:

I. We understand the "industrial classes" to embrace all those whose vocations or pursuits ordinarily require a greater exercise of manual or mechanical than of purely mental labor. It is impossible to draw a sharply defined line between the industrial and professional classes, for every occupation demands both mental and manual effort. But in the absence of any authoritative definition, either by courts or lexicographers, and for the purpose of marking the general boundaries which, in our opinion, should divide agricultural from other colleges, we accept the recognized distinction between the mechanic or industrial arts and the liberal arts, as given by Webster: the industrial arts are those in which the hands and body are more concerned than the mind; the liberal arts are those in which the mind or imagination is chiefly concerned.

II. While not necessarily ignoring other and minor objects, the leading and controlling object of these institutions should be "to teach such branches of learning as are related to agriculture and the mechanic arts." Prominence should be given to these branches in the degree that they are actually used by the farmer or mechanic.

III. As against the opinion that the aim of these colleges should be to make thoroughly educated men, we affirm that their greater aim should be to make men thoroughly educated farmers, and for three reasons:

1. A student may receive the highest scholastic education afforded by universities, and yet know nothing of practical farming.

2. Although we hold that the mental faculties are as well disciplined by the mastery of those sciences which relate most directly to agriculture as by the study of any other branches of learning, and therefore that mental development can be as truly gained in agricultural as in other colleges, yet we affirm that

their greatest aim should be to teach the farmer how best to apply the truths of science in the management of his farm, and how most to profit thereby.

3. The primary aim of literary colleges is, and for centuries has been, to discipline the mind, other purposes being secondary. The doors of these noble institutions are alike open to the children of the industrial and the professional classes. It is neither necessary, economical nor wise for the State to maintain an agricultural college which shall seek to do precisely the same work for the same purpose. Congress evidently had quite a different purpose in view when, as in the title of the organic act, it designated these colleges as for the benefit of "Agriculture and the Mechanic Arts," instead of "for the benefit of the children of farmers and mechanics."

IV. As a larger number of the citizens of Kansas are engaged in farming than in any other industrial pursuit, we are agreed that in this institution greater attention should be paid to the sciences which most concern agriculture than to those which relate to the mechanic arts. Nevertheless, since most of these branches of learning are equally useful to the mechanic; since some skill in the use of the mechanic's tools is advantageous to the farmer; and more especially since the Congressional grant was made "to promote the liberal and practical education of the *industrial classes*," upon conditions which cannot be repealed by State sentiment or enactment; we feel bound, in so far as we shall have the ability, both as the lawful trustees of that grant, and because of the peculiar necessities of a young and growing State, to place fairly within reach of the youths of Kansas, such knowledge and skill as will best and soonest enable them to earn an honorable livelihood by the practice of some one of the industrial pursuits, common in the State.

In accordance with these views, the Board has made every effort and fully purposes to use every proper means for executing the policy first officially announced September 3d, 1873, and hereby reaffirmed:

"For the purpose of defining the policy of the Board of Regents of the Kansas State Agricultural College, and as a guide to the Faculty in preparing a new curriculum—

"*Resolved*, That the object of this institution is to impart a liberal and practical education to those who desire to qualify themselves for the actual practice of agriculture, the mechanic trades or industrial arts.

"Prominence shall be given to agriculture and these arts in the proportion that they are severally followed in the State of Kansas.

"Prominence shall be given to the several branches of learning which relate to agriculture and the mechanic arts, according to the directness and value of their relation."

A statement of the reasons why the Regents hold this policy was made in President Anderson's first report to the Board, as follows:

The act of Congress endowing agricultural colleges, prescribes that their leading object shall be "to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

I. WHAT IS A LIBERAL EDUCATION AS PRESCRIBED BY THIS ACT?

Words, like trees, are the product of various elements, and often of many centuries. *Liberal* is a case in point. The Roman slave was subjected to a bondage compared with which the worst form of American slavery might be deemed liberty. A man who was "no slave" was called "liber." In those days more than in these, manual labor was the chief service of the slave. Hence the condition of the "liber" was, in a general sense, a condition of freedom from manual labor. During succeeding centuries, but still under tyrannies, the French *liberal* and the English *liberal* retained the leading signification of general freedom from that physical toil which is the warp and woof of a slave's daily life. Early English authors designate by it "that which befits a 'gentle-man'" as distinguished from a manual laborer, and that it yet expresses the original meaning is evident from its present use as applied to the arts. Webster draws the line between the liberal and the mechanic or industrial arts in these words: "The liberal arts are such as depend more on the exertion of the mind than on the labor of the hands; and regard amusement, curiosity or intellectual improvement rather than the necessity of subsistence, or manual skill." A glance at history will show how pertinently this word described education. The Reformation exerted a resistless influence upon the scope and direction of education. The new order of things forced the clergy, who had previously constituted "the learned" class, to the acquirement of greater information, especially concerning the ancient languages and beliefs. The growth of constitutional governments necessitated the careful education of men skilled in the principles and precedents of law. Increased knowledge compelled a corresponding education of physicians, of scientists, and, as indispensable to all, of competent teachers. These vocations compose what are yet commonly known as "the professions." It certainly is emphatically true of each of them, that the labor required in their practice is mental. As compared with the farmer, the preacher, lawyer or doctor is relatively exempt from physical toil. Hence an education designed for these professions would naturally be called "liberal;" and until quite recently, no other pursuits have been deemed worthy of the educator's notice.

It is in this light, glinted to us by the billows of many centuries, that we are to read Webster's definition of liberal, *i. e.*, "Befitting a freeman or gentleman, as liberal arts or studies; liberal education, that is, such as is extended beyond the practical necessities of life."

The debates of Congress upon this bill, everywhere show that both its friends and enemies used the phrase "liberal education" in the proper and accepted sense.

A single extract from the speech of Senator Harlan, of Iowa, in reply to Senator Mason, of Virginia, will suffice:

"There may be those who are not disposed to give the means for the development of the minds of the masses, those whose interest it is that the laboring men of the country should be ignorant, should be uneducated and dependent; that their sweat and toil may be used to advance the interests, and promote the happiness of those more highly educated and refined; it may be that it is a blessing to Virginia that she is now more largely represented by adult white

people who are unable to read and write, in proportion to her population, than any other State in the Union. It is a blessing, however, the people of my State do not covet. They prefer that the mind of the laborer be developed; that the intellect of the man who labors and sweats for his own bread should be more highly endowed, in order that that class of people may become their own representatives, even in the legislative halls of the nation." [Feb. 1, 1859.]

There can be no doubt that by the use of the word "liberal" Congress marked out the broadest pathway to mental power and culture. Whatever long experience had proven to be valuable in the education of the professional classes, Congress designed that agricultural colleges should use in the education of the industrial classes. It was eminently fitting that the widest scope of study, the best appliances, and the most competent teaching enjoyed by the sons of the English aristocracy, should be freely provided for the American farmer and mechanic. For if any *liber*, or "no slave," is entitled to a *liber*-al education, it is the son of American *liber*-ty.

He possesses a liberal education who has learned that which is known or believed of the more prominent subjects of knowledge. Literary is that which pertains to learning; hence I have designated the departments of this college through which it seeks to give a liberal education, "**Literary Departments.**" They have for their broad foundation the purpose which Congress expressed by the word *liberal*; their scope is equally wide; their aim, as far-reaching; their rule, thoroughness; and their only limitations such as are imposed by the youth and poverty of the College, or by the student's lack of ambition, time or money. I have dwelt at such length upon this point in order that the line which divides these from the industrial departments may be more sharply drawn, and in order, by contrast, to throw into bolder relief the further idea which Congress expressed, by using the word practical—"liberal and practical education."

II. WHAT IS A PRACTICAL EDUCATION AS PRESCRIBED BY THE ACT?

Practical means "pertaining to practice;" practice signifies "actual doing, or the thing done; that is, the regularly doing, or the thing regularly done." The Greek verb *prasso*, meant "to do, to work; to follow a business, trade." The adjective *praktikos*, "fit or disposed for doing or performing; fit for business, business-like;" hence our word practical, that which belongs to the actual doing. It matters little in this connection what particular shade of its meaning is taken. We may say with Webster, that a practical education is one "capable of being turned to use or account; useful in distinction from *ideal* or *theoretical*," and since the sciences as taught in a liberal education are but collections of ideas or theories, a practical education must be quite distinct therefrom; or we may say that such an education, like practical skill, is one "derived from actual doing." All of this simply amounts to saying that a practical education, as prescribed by the act, is one that "fits a person for actually doing business," be the kind of business what it may.

We have already noted the influence of the Reformation upon education. A glance at the causes which impelled Congress to require for the industrial classes a practical as well as a liberal education, will show yet more clearly what it meant thereby. These causes are to be found in the magnificent progress of

American invention. They spring from the same sources that have filled the patent office with models, and the world with machinery. And if any elements may rightfully mold and energize the processes of education, certainly may those which, since the days of Franklin and Fulton, have placed Americans in the foremost ranks of the world's appliers of science. The nation of plows and reapers; of cotton gins, spindles and sewing machines; of railroads, clippers and Atlantic cables; a nation which has reached out its countless roots broadly and deeply into the exhaustless soil of liberty, and whose forces, therefore, are as active and eternal as the will of the God who created them; the nation of a free Bible, free schools, free press, and a free ballot-box; such a nation, both as a measure of justice and necessity, would be apt to demand, and very apt to enforce the demand, that the processes of education should be as precisely and as fully suited to the special wants of the thronging industrial classes as is the education of the English university suited to the special wants of the English professional and aristocratic classes.

And the fact that such an education must of necessity require manual labor, so far from deterring, would rather stimulate Congress in making, and the people in enforcing, this new demand. When the line is drawn between those persons whose chief work is mental and those whose chief work is physical or with machinery, who so nearly constitute "the people" of America as do the industrial classes? From the very extent of our territory and the exhaustlessness of its seen and unseen resources, these classes, for all time to come, must, as compared with all others, be the nation. In what quarter of the globe does the plowshare annually turn over so vast a breadth of virgin soil, and press onward even more rapidly than the sword to conquer the wilderness? What land is so netted and meshed with iron highways that groan under the weight of whirling products? What air is so filled with the hum and clang of mechanism? American products and fabrics, the results of manual labor, are carried in American vessels, the creation of manual labor, to the ports of Europe, Asia and Africa. And it is very easy to see what Congress meant by the demand for an education capable of actual use in daily business, and, therefore, one gotten by actual practice; and just as easy to see why it made such demand.

It is a significant fact, and worthy of mention in this connection, that the only opposition to the act came from those who looked upon workingmen as "mud-sills" and "greasy mechanics." In the year 1859, under the leadership of Mr. Morrell, a Representative from the State of Vermont, this bill passed both houses, to be vetoed by American slavery, with the pen of James Buchanan. In the year 1863, under the leadership of Mr. Morrell, then a Senator from the State of Vermont, it again passed both houses, to be signed by American liberty, with the pen that wrote the Proclamation of Emancipation and the death warrant of American slavery.

III. IN WHAT RESPECTS SHOULD A PRACTICAL EDUCATION DIFFER FROM A LIBERAL EDUCATION?

It is well to revert again to the influences which have brought what is commonly regarded as the standard education into its present shape. All of the best American colleges provide about the same course of study. Where did

they get it? Originally from England, with some modifications of details. But where did the English institutions obtain it? Nowhere. It grew. Two necessities governed its growth: 1st, The need for certain kinds of knowledge which men wished to use; and 2d, The need for training those faculties by which that knowledge was applied. It is evident that the classics first obtained their place in the curriculum simply because those languages contained information that was useful to clergymen, histories and precedents indispensable to lawyers, and theories deemed valuable to physicians. The notion that the classics afford better mental discipline than do other studies, was an after-thought, not an original purpose. Mathematics was introduced mainly for the benefit of the astronomer, and not of the merchant; any crumbs picked up by the latter were dropped by accident. Physiological studies were gradually provided for the embryonic physician, and political economy for the heir to a seat in the House of Lords. In later days, the natural and physical sciences have been included, but chiefly for the benefit of scientists. We can thus see not only why the standard curriculum has its present proportions, but also that it is admirably adapted to impart just the knowledge that will be most useful to professional men in after-life.

And now, what faculties or organs does it aim to train—the mental, or the physical? Those of the mind. Why? Is it because mental discipline is more valuable than physical training? Is it not because the theologian or lawyer who seeks to apply the truths of reason, only uses his mental powers in making the application? In such work it is wholly immaterial whether his feet be trained, or for that matter whether he have feet. His mind acts independently of his physical organs, save as it depends upon the body. If in later days Shakspeare had lost the use of every organ except the tongue, he could nevertheless have given to the world those masterpieces which will endure long after cathedrals have crumbled. The mind is the only power which can grasp truths, handle inferences, construct arguments, or shape policies, even though these guide nations to the grandest victories. The blind Milton erected a palace that will challenge the admiration of centuries; but it was built of ideas, not granite; framed and bolted with thought; glorified by resplendent genius. From the nature of the case, a professional education does not require any discipline of the physical organs; and the fact that when a particular skill is needed in a profession, as that of the hand by the surgeon, this drill is given, only strengthens the general proposition that the standard education of to-day, is chiefly designed for the benefit of the professional classes. But when we seek to apply the truths of science to matter, physical as well as mental ability becomes essential. Just as the finger cannot touch thought, so thought cannot touch stone. The will of the mind can only be carried into effect by the body. And for the very reason that the professional classes required mental discipline, the industrial classes require manual training as well; for these are the men whose work is with soils and wood; rocks, ores and metals; winds, waves, steam and lightning; and that work can only be done by the use of the physical organs.

This distinction ought never to be forgotten. The use which is to be made of any science should determine the form and extent of its presentation to the

student, the faculties or organs to be trained, and the relative strength or dexterity required. If that use is professional, adapt the studies thereto, and train only the mind; but if it is industrial, reapportion the studies, and train the physical organs by which they are industrially applied. The degree of this discipline or drill must be equal to the mental or manual skill, or both, required by the vocation. What assiduous study by the student is in school, equally assiduous labor is in the field or shop; for skill is the result of much "actual doing." Only at the handles of the moving plow can the boy become a plowman. The student of carpentry may have mentally learned the scientific truth that a straight line is the shortest distance from one point to another; but when he tries to rip a straight line through a board he discovers that his eye and hand must learn the same truth, that it is far more difficult to educate the body than the mind, and that practice alone makes perfect.

IV. DESIGN OF CONGRESS.

When, therefore, Congress ordained a liberal and practical education for the industrial classes, it logically and inevitably required both the teaching of learning and the teaching of the trades.

For then, as now, scores of venerable and vigorous colleges afforded a liberal education. They not only taught all the branches of learning which relate to agriculture and the mechanic arts, but, because of their strength, taught them better than could be done by younger institutions. Nevertheless, that education was virtually adapted to the wants of the professional classes.

After showing its appreciation of these institutions by liberally endowing new ones of the same kind, Congress yet more liberally endowed colleges for the education of the industrial classes, and called for an accurate revaluation of the several branches of learning by the original standard of their exact usefulness. It demanded their reapportionment, their presentation from a new standpoint, their application in new directions and along the shortest lines, and the provision of wholly new appliances. It demanded for these institutions all the knowledge, instruction and apparatus which then existed, or would exist, in the best literary colleges, so far as useful to the industrialist; and then, in addition and beyond all this, it demanded farms, nurseries and herds, kitchens, sewing-room and dairies, work-shops, printing and telegraph offices, photographic, pharmaceutical and assayer's laboratories—in short, every appliance employed in industrial work. And from the very nature of the case it required that these appliances should be for the personal and continued use of the student, and not merely as means of illustration in the hands of the teacher; because only by such use can the student acquire a "fitness for doing actual business."

As already stated, the function of the Literary Departments is "to teach such branches of learning as are related to agriculture and the mechanic arts." The function of the Industrial Departments is to render the student skillful in the several operations by which the farmer and mechanic can apply that learning with the least labor and greatest profit.

Neither of these general departments must overshadow the other; neither must interfere with the other. Their respective foundations are equally broad and their mission equally noble. They must walk hand in hand at any and every sacrifice, and must harmoniously work to a single end—the benefit of the student.

Course of Study.

It is frequently urged that the majority of the graduates of agricultural colleges become professional men. The charge is correct, so far as this Institution is concerned, and, for two or three years, it will likely be correct. Either these colleges must turn out real farmers, mechanics, or those who follow other industrial pursuits, or else be logically adjudged to have failed in the execution of the purpose for which they were endowed. There can be no radical change in results except there first be radical changes in the producing causes. Let us seek for these causes through the results.

What governs the newly fledged graduate in his choice of a vocation, when forced thereto by the necessity for earning a livelihood?

If another man has a capital of \$10,000, upon the income of which he must live, he invests it in that business which promises to pay best. Usually, the only capital of the graduate is the knowledge which he has gained in college, and the use he can make of it: in other words, his "education." If he can make more out of this capital as a teacher than as a farmer he will be a teacher. But if he knows more about farming than about dead languages, and has greater skill in handling stock than in handling the technicalities of science, self-interest will make him a farmer. He will invest his capital where it pays best. Now, the course of study which he has followed in college must inevitably determine the kind of capital he has acquired, just as the direction of the tongue determines the direction of a moving wagon. Hence, in deciding upon the best course of study for an Industrial Institution, two questions arise:

1. Is that knowledge which experience has shown to be of most value to the future lawyer, doctor or preacher, equally valuable to the farmer, mechanic or business man?

2. In educating men for the farm are we to teach the same sciences, in the same proportions, and with the same applications, as when educating men for the professions?

The routine work of the farmer is as different from that of the minister as is the work of the merchant from that of the sailor. The knowledge which is of most use to the one is not equally, if at all, useful to the other. Hence, it certainly is clear that the course of study followed by the future farmer should differ from that taken by the future preacher, just in the degree and to the extent that the uses which each will make of knowledge are different. Farmers need an education as

broad, thorough and practical as that of lawyers, but they do not need the *same* education, any more than the astronomer and surgeon need the same education.

What knowledge will be most serviceable to the future agriculturist? He cannot, in a life time, much less in the few years spent at college, acquire all knowledge, or learn a tithe of all that is interesting, curious, or even distantly related to agriculture. He is limited by want of time, and often by lack of money, so that he must select from among the things known those which will give him the best success as a farmer.

He needs a practical knowledge of his own language, that he may fully understand the ideas of others, and sufficient skill in the use of that language to express his own ideas clearly and vigorously; but does he need the same familiarity with Latin, Greek and Hebrew, that is essential to the best success of a professor of philology in a European university? or does he need the same skill in rounding sentences and selecting rhymes that is prized by the poet? He needs a knowledge of mathematics as used in business life, and such skill as will enable him readily and accurately to make all the computations and keep all the accounts incident to his occupation; but are conic sections and the calculus as serviceable to him as to the astronomer?

Up to a certain point, English and Mathematics, if practically taught, are of great value to every man, no matter what his vocation; but, neither is in itself an end. Each is only an instrument to be used in gaining an end; and the first object of the student should be the acquisition of a ready skill in the use of the instrument. If, *after* so doing, he is able to study the curiosities of literature, as an expert, so much the better; but ability to write legibly, to spell correctly, to speak grammatically, and to use the word which exactly expresses his meaning, is of far greater moment. And it is a fact that oftentimes practical English and practical mathematics are sacrificed in the effort to rush the student through the "higher," and, so far as he is concerned, the "fancy" branches of each.

The principle of selection thus indicated is applicable to a score of other sciences; all of which are interesting to the scholar of elegant leisure: each of which is of great value to one specialist, but of no value whatever to another specialist, and many of which are practically valueless to the farmer.

But now there are some kinds of knowledge which are of especial service to him, and which are not equally so to the physician, jurist, or mechanic. His daily work is with plants; and plants are but so many curiously wrought machines. These have different parts, which perform different services, and which depend upon dissimilar conditions. For exactly the reason that a practical knowledge of anatomy is useful to the surgeon, is a practical acquaintance with botany useful to the farmer.

But plant machinery does not impel itself; it is driven by forces chained in the earth and air, as the engine is driven by steam. He needs to know both the mechanical and chemical action upon plant growth of light, heat, water and soils; and how to increase or decrease this action, as his interests may require. Hence, a practical knowledge of physics and chemistry is valuable to him.

Plants are subject to the depredations of insects and birds. These, in turn, are devoured by others. He should know and cherish his zoological friends, and use their instincts in the destruction of his foes. Two reasons make a knowledge of the habits and value of domestic animals indispensable. First, because they furnish his motive power for the plow; and second, because many of his crops can be profitably sold only after their conversion into flesh and milk.

The knowledge of these, as of other sciences, should be imparted and acquired with reference to the use which he is to make of it, viz: as enabling him to correctly answer the question that is always uppermost in the true farmer's mind—"Will a given thing pay?" Real farmers do not plow from dawn to dark, swelter in the harvest field, or shiver in the corral, just for the fun of the thing. They farm for profit. They do not toil in order that the sweat may trickle to the earth, but in order that they and theirs may eat the bread which can only be earned by the hard labor which brings sweat. Neither working nor sweating is the chief end of farming: profit is. And if the farmer can gain the end by substituting machinery for his own muscles, he will. Nor is a knowledge of the sciences which relate to agriculture the chief end of farming: it, like work and wagons, is only a necessary means to be used in gaining the real end. As in the case of English and mathematics, so botany, physics, chemistry and zoology may be taught in either of two ways:—First, as pure sciences; second, as practically useful to the farmer. In the former case, the student will become a scientist; in the latter, a capable farmer. And often

there is as much difference between the two men as there is between a law library and a successful lawyer. Hence, even those sciences which relate most directly to agriculture must be re-arranged and presented to the student with controlling reference to the use he will make of them. So widely different is this use from that which the "man of science" makes that, unless they be so taught, nine graduates will become professors of a given science where one becomes an actual farmer. It is not improbable that the real experience of those colleges in which these are taught as pure sciences, and to which there is merely an agricultural attachment, will corroborate this statement. And, it may be incidentally remarked that, were there no other objection to the mooted proposition of increasing the endowment of the University of Kansas, by removing this College to Lawrence, the above would be insuperable. Desirable as it undoubtedly is that the State Institution which is expressly designed to educate lawyers, doctors, preachers and professors should be liberally supported, yet, because of the difference between the uses which the industrial and professional classes make of knowledge; and, therefore, because of the difference which there ought to be in teaching the same science to the one or the other, the mooted consolidation would inevitably be death to the practical education of farmers. Whether the professional classes of Kansas should be educated by the absorption of an endowment expressly made by Congress for the education of the industrial classes of Kansas, is a question in the decision of which the voters of Kansas would be very apt to take part, either directly, or, if accomplished, in affecting the political welfare of the accomplisners.

This re-arrangement and special presentation of a science does not necessitate either narrowness or superficialness, because knowledge must be acquired before it can be applied; because it is more readily acquired when presented as a system, or science, than as hotch potch; and because he who intends to make a specific use of knowledge, for profit, will study better than he who only aims to pass the examination for a diploma. A competent machinist must thoroughly understand the principles of mathematics and be able to apply them in his business. Is he less a mathematician than the college graduate who also understands the principles, but who, very often, can make no practical use of them; and who, though able to calculate an eclipse, with greater or less accuracy, cannot tell the capacity of a cistern or corn crib, or be safely trusted to measure wood? It is very well to talk

flippantly about the "bread and butter sciences," but, as between these and the cake and candy sciences, men who work for a living prefer the former as a regular diet, if they cannot have both. It is better for an Agricultural college, at least, after furnishing its students of agriculture with plates and knives, in the shape of English and mathematics, to *first* give them a full course of roast beef and vegetables, in the shape of economic botany, chemistry, practical agriculture, etc., and *afterwards*, a dessert of dead languages and fossils, than to invert the order; because, if the student has not time to take the whole meal—and the majority of students have not—the main course will be of more value to him than the dessert. If he can, let him take both.

But when all the sciences useful to the farmer have been taught as indicated, and with the best results, the student has still an essential part of his education to gain, namely, such skill—both mental and manual—in applying knowledge to farm work as will ensure him the largest income with the least outlay of money, labor and time.

Notwithstanding a common opinion to the contrary, there is evidently a necessity for professional teachers of Practical Agriculture and Practical Horticulture. If agriculture be regarded as the aggregate of several recognized sciences, and, therefore, as itself a science, it deserves the same carefulness in teaching accorded to the sciences of which it is composed. Or, if regarded as only an art, so completely does it depend upon these sciences, so complicated are its applications of their interwoven truths, and so important are the consequences of a skillful or bungling exercise of the art, that no pure science presents a stronger claim for capable masters and thorough drill.

The teacher of an established science necessarily views it from the standpoint of investigation or inductive discovery, and so presents its facts and theories, directing them to the wants of the farmer as best he may. The teacher of Practical Agriculture must view the same science from the wholly different standpoint of "Will it pay the farmer?" The conclusions reached by the two men will sometimes clash, for trial frequently shows that a proven fact of one science is so modified by an equally proven fact of another science as to be relatively valueless in combination. This experience is not confined to agriculture. The keenest experts of the Patent Office, after close study of a working model, and upon seemingly the best scientific grounds, frequently decide the proposed application of a given principle to be

correct and valuable ; whereas, the construction of the machine shows that it either wont work at all, or wont work profitably. And if such be the fact in the science of mechanics, the principles of which are mathematically demonstrable and easily traced in a combination, how much more is it apt to be the fact when we attempt to deal with the subtle forces of light, heat and moisture, hidden in mysterious combinations and producing fantastic results? No science used by man more imperatively demands the constant test of actual experience. The iron used by the blacksmith in every state is practically the same, but the soil which the farmer in Kansas works is not practically the same as that of Ohio or Maine, and sometimes the same farm has as many different soils as acres. The flame and tools of the smith are the same everywhere, but how great are the diversities of the warmth and rains which build plants and furnish fruits !

It is frequently asserted that a boy will become more skillful in the practice of agriculture if kept at work on the home farm, under his father's guidance, provided the latter be a farmer, than if placed under the instruction of a professor of practical agriculture ; hence, that there is no necessity for professional teaching.

Evidently, this depends upon several things. If the father has a better knowledge of the scientific principles actually used in agriculture ; if he can apply these principles more successfully ; if he has better apparatus for illustrating both the principles and their applications, in the shape of a greater variety of soils, of the best implements, cultures, crops, cattle and fruits ; if he is a better teacher ; and if he will fully devote himself and his farm to the task of teaching the boy what to do and what not to do as a practical farmer, and of drilling him in the best ways of doing a desirable thing and of preventing an undesirable thing—certainly such a farmer should keep his boy at home, unless the latter is deficient in that branch of education given by the literary departments of the college. But is this fortunate combination of essential advantages often found? On the one hand, many capable farmers are not able to buy the necessary apparatus. On the other, many rich farmers have not the requisite scientific knowledge. And he who possesses both the means and the knowledge, however willing to teach his own son, is usually not so willing to follow the business of teaching other men's sons, simply because farming pays better than teaching. These advantages should be provided by Agricultural Colleges, and should be used in giving the best

instruction and drill in the practice of agriculture. Whether they really are so provided and used is another question, but evidently they can be.

The above assertion would not be so frequently made by experienced farmers without some reason. In many instances, their observation of men who claimed to farm "scientifically," has justified one, and often both, of two conclusions: either, that the given claimants made false pretensions, or, that "scientific farming" mixed a little sense with a deal of humbug. Furthermore, there is a natural tendency to overestimate the actual power of science, and to believe it possessed of a greater practical value than it really has. And there is no doubt that in many colleges too much attention has been given to overestimated branches, and too little, or none at all, to drill in the practice of agriculture; as an inevitable result their graduates have not succeeded in farming as well as neighbors who never attended college.

The only remedy is to give thorough instruction in *practical* agriculture, that is, agriculture "*fit for doing business*." Evidently, cultivated fields are the true text books for this instruction; the best experience of successful farmers is its proper lesson; and their balance sheets its final authority in deciding doubtful points. Ordinarily, practical agriculture comes to the sciences as a questioner, asking for the explanation of a fact, rather than as an apprentice seeking rules by which to work. And, while giving an attentive ear to the statements of science, its true function is to test these statements by the sole standard of real profit; to reject those which, though scientifically valuable, are found valueless in practice; and courageously to adopt, exemplify and proclaim methods which ensure the greatest profit, even though these be inexplicable or ridiculous to pure science. As the pendulum of a clock at one instant checks and at the next helps the action of the weight, so should it now check, then help, but always regulate the utterance of science to the student of agriculture.

As in other arts, it is much easier to memorize the principles of agriculture than to become skillful in their application.

Educators are apt to forget that the bulk of the farmer's work requires manual or mechanical force. He deals chiefly with matter. Probably more pounds of dead weight are annually lifted on a given farm than in any shop employing the same capital. In plowing one hundred acres six inches deep, 80,600 cubic yards of earth must be

moved; then follows the work of harrowing, rolling, stirring, harvesting, housing, cleaning and marketing. If, on the first of January, each farmer were shown a mound to be leveled, equal in weight, bulk and solidity to that of the material which he must handle during the year, and which could be removed only by a force equal to that which he must use, many would despair of accomplishing the task at all, or at least of making a profit; and all would realize the imperative necessity for employing the best and cheapest power, for using the best tools, and for exercising the greatest skill in their use. The amount of work to be done would show why, in turning the soil, a spade is cheaper than a stick, though it costs more; why a plow is cheaper than a spade, and the strength of a horse than that of a man. It would equally show that dexterity in the use of tools is a deal cheaper than awkwardness, though its first cost be greater. No one doubts that the mechanic needs skill, or that his education should include the practice in the use of tools by which alone skill can be acquired. Why, then, exclude from the education of a farmer a corresponding practice since, year by year, he has a greater weight to lift, and tasks to perform equal in variety and exactness?

This practice, too, is clearly to be regulated by the standard of profit. If a boy can already plow well, why keep him at it when his time can be better expended otherwise? If he cannot, why not make him as skillful in plowing as in naming the capes of Greenland? It will not pay him to acquire the skill of the cabinet maker because such skill is not needed in building fences, but it will pay him royally to acquire the ability to make a gate, put in a spoke, point a plow, set a horse shoe, paint a wagon, mend a strap, set up a reaper, replace a box, build a wall, cut a stone post, and lay a drain. The cry of "making him Jack-of-all-trades and master of none" may be quite startling to those who don't think. When applied to a carpenter or printer it may be pertinent; but, because farm work daily calls for the performance of the simpler operations of some one of these trades, "Jack skill" makes just the difference between a handy and a helpless farmer, the difference between success and failure. Hundreds of farmers will testify to their loss of precious hours because of an inability to make repairs which any boy can be taught to make.

The acquisition of this skill requires physical labor, just as the acquisition of a science requires mental labor. Hence, physical labor should be "compulsory," in the same sense, and for the same purpose,

that mental labor is compulsory; but in no other sense, and for no other purpose. There is no greater "dignity" in labor than in rest, but there is a noble dignity in that kind of manhood which faithfully discharges every duty of life, whether it involves labor or rest. Washington displayed as much heroic generalship in his wise retreats as in his furious attacks; but neither retreating nor advancing is valuable save as a necessary means of winning the final victory. No man labors for the mere purpose of laboring, but only because a desired end cannot be gained in an easier way; nor does any animal. And it is difficult to see why a boy should be made to do that which no other creature does, and which he will never do when a man. So long as a student feels that he is gaining either knowledge or skill that will be valuable to him as a farmer, he will work in the field, in the nursery, with the cattle, or in the shops as cheerfully as he plays, and more cheerfully than many study; but beyond that point, or for any other purpose, "compulsory labor" is no more beneficial to him than it would be to his father. So far as "exercise" is concerned, the natural tendency of healthy youth toward fun and frolic may be safely trusted a few more centuries.

The practice required in any branch of practical agriculture should be determined by the actual wants of the farm and the aptness of the student. Little things should not be overlooked, nor greater ones be unduly magnified; the object being to produce a graduate able to succeed as an intelligent and skillful farmer. The majority of Kansas farmers raise grain as a market crop, and vegetables, fruit and butter chiefly for their own tables. Practical agriculture should cover the same ground, and proportion its instruction and practice accordingly. Frequently, however, some other product becomes the leading market article, and demands a different distribution. To the stock raiser, skill in manipulating the conditions upon which animal life depends is more valuable than skill in raising cereals. The dairyman, nurseryman, market gardener and florist have different problems, and each must make a wholly different arrangement of its elements. Now these specialists should have a general knowledge of, and competency for, all branches of farming; because the profits of each branch may at times be increased by a greater or less following of all, and because permanent changes in the general market necessitate corresponding changes in general farming. Nevertheless, when a student has decided to become a specialist, he should, after acquiring general skill,

have an opportunity for extended practice in the chosen branch, whether in the handling of cattle, in the dairy, the nursery or the greenhouse. Provision is made therefor.

The same principle—that of determining the education by the real demands of the proposed vocation—should decide the proportions of the whole course, literary as well as industrial; and the student should at once take the course leading to his vocation.

There is no greater difference between the skill valuable to a lawyer and that which is profitable to a sailor, than there is between the skill needed by a farmer and that needed by a machinist, or that of a druggist and that of a printer. The same knowledge has a different value to each. Putting off the choice of an occupation until after the student leaves college as a graduate, instead of making it when he enters college, or as soon thereafter as possible, is a grand mistake. Studies are taken and years spent without a definite aim; much is acquired only to be forgotten in after life, simply because not demanded by the occupation of after life; and much is omitted that would have been of great value. Few fathers would send a son to New York to spend \$10,000 without first deciding upon what to purchase. But many fathers send their sons to college to get an "education," without further thought. Education for what? What does the boy want to buy?—ability as a lawyer or as a farmer, as a preacher or as a mechanic? The sooner the objective point is decided the more profitable will be the expenditure of time, brain and muscle.

One thing is certain: that the majority of men who, after ten years of semi-starvation in a "learned profession," find themselves and their little ones facing the prospect of whole starvation, could better increase their income by farming, had they the requisite skill, than in any other way. There are men in every community who remain in a profession, not because they are fitted for it, or because they like it, but only because they can do nothing else. This condition of things is a necessary result of the convergence of our whole educational machinery, from the common school to the University, upon the professions. They must be overcrowded. And it is equally certain that until a boy has chosen his occupation, it is better for him to take the farmers' course in a good agricultural college than to take the aimless course of a literary institution, and find himself, on graduation day, "with the best education his country affords, and ——— unable to make a living!" In proof of this statement, take, as an illustration, the case of

a boy who is able to earn, including boarding, thirty dollars a month as a farm laborer. His wages are equal to the interest on \$3,600, at the rate of ten per cent. In other words, what he knows and can do is worth as much to him as \$3,600 would be if he did nothing. He spends four years at a literary college. How much has he increased his capital? Very few of its graduates can go on the market and at once command situations at more than thirty dollars per month. Usually, two or three years must then be spent in professional schools, and one, two or five years more in waiting for a practice that will pay one hundred dollars a month. Or, if the graduate enters commercial life, from one to three years are spent in learning the business. Suppose, instead, that he spends the four years in an industrial college. At graduation, he can command, in the market, sixty dollars per month as the foreman of a grain or cattle farm, or on his own homestead. Mechanics, printers, druggists and operators can do the same. The student has doubled his capital, or has made \$3,600, when before he had made nothing that was in shape to use. And, with the same frugality, industry and shrewdness which the professional graduate must exercise, he will, at any subsequent period, earn more with the same labor. In other words, his industrial education is worth more, costs less and is more available. It is well for men to look the educational question squarely in the face, and to substitute common sense for traditional and groundless sentimentality.

In regard to the question whether a farmer should be as generally educated as the professional man, evidently that is a matter which each student must decide for himself, and which an agricultural college must furnish according to the decision. If, after first learning those things which will be of most value in the transaction of his business, he has the time and means to take an extended course in classics, history, mental, moral and other sciences, it can be given. The only point made is, that the interests of students who are limited in means and time shall not be tramped out by a blind obedience to a senseless custom.

The farmer needs a thorough and direct education as much as does the physician.

Both deal with the subtlest of forces—life! The one seeks to control the conditions on which human life depends; the other, those on which animal and vegetable life depend. The one grapples with the diseases of an impaired body, and his battle is usually short and deci-

sive. The other struggles to win from earth and air that food without which all bodies must perish. His battle is longer, less exciting, but none the less decisive; for continued defeat brings poverty, and grinding poverty brings exposure, exhaustion and diseases that laugh at medical skill. There is no apparent reason why a direct education, as valuable to the farmer as is the best medical training valuable to the physician, cannot be provided; and it is believed that the principles above set forth must alone and absolutely determine the studies and assign their proportions. For, if an industrial college provides the same road to knowledge found in literary colleges, its graduates must inevitably walk to the same point reached by their graduates, other things being equal; and, having gained the same knowledge and skill, or capital, and this capital commanding a greater profit in the practice of, say, law than in farming, the chances are that its graduates, actuated by a proper self-interest, will become lawyers, and will not become farmers, because the skill demanded by the two vocations differs as wholly as ability to write a poem differs from ability to construct a locomotive. The average curriculum of literary colleges is the result of careful thought, corrected by the experience of centuries; and it justly claims the confidence awarded to a route over which, for generations, men have passed to the highest eminences of law, theology, medicine and science. But for this very reason it is neither the direct nor the best road to success in the field, the shop, or at the counter.

After so full a presentation of the principles which should determine a course of study for the education of farmers, it is not necessary to discuss with equal detail a course for mechanics. The points to settle are: What ability does the given trade require? How much of this ability is mental, and how much manual? What sciences furnish the requisite knowledge, and what drill the needed manual skill?

It is not essential that the carpenter should know how plants grow or how \$40,000 cows are bred, because his business is as different from farming as is farming from preaching. But it is essential that he should know the fitness of the different kinds of wood for different purposes, and the principles of framing, ornamentation and stair building. He requires dexterity in the use of the rule, saw and plane, and not of the plow.

Each trade requires a special ability, and, therefore, a special knowledge as well as specific manual drill. So great is the diversity in these respects that, at first glance, there seems to be no leading science which is useful to all, in the sense that botany and chemistry are useful to the farmer. Notwithstanding this diversity, it will be found that practical mathematics, either as it treats of numbers or of lines, has a greater or less cash value for each of the trades. Take the case of two carpenters of equal skill in the use of tools and equal credit, about to bid for the erection of a costly building, the one a poor arithmetician, the other a practical mathematician. The latter understands exactly what the detail drawings indicate and what the specifications require; his estimates for material and labor are more exact, for his greater knowledge solves many questions that remain doubtful to the former; hence he allows less margin for work that is new to both, bids lower, employs his competitor at journeyman's wages, performs less physical labor and receives a far greater profit. With increased capital and experience he is more apt to become a builder and to earn a builder's percentage than the former. His extra knowledge has a cash value equal to the difference between the incomes of the two men. With less hard labor, the stone cutter earns more than does the stone mason; the machinist more than the blacksmith; the job printer more than the compositor; the milliner more than the seamstress; and so on all the way through. The worth of mathematics to the builder, machinist, and engineer is apparent, but it may be asked: How many dollars will a knowledge of algebra add to the wages of a sign painter, or a knowledge of geometry to the pay of a clerk? Evidently, none, except in the way of general mental discipline, which we are not now considering, and which may be equally given by studies that have a specific worth. There are two great branches of mathematics; the one uses numbers or symbols for computation, the other uses lines for representation. As educational agents the former will most develop the reasoning powers, and the latter the perceptive faculties. As a tool, science chiefly handles mathematics in the solution of abstract problems; whereas, business handles it for profit. And just as the use which the sculptor makes of mathematics differs from that which the astronomer makes, so ought their antecedent study of lines or of symbols to differ. The several arts and trades use either or both branches as their interests dictate. The tinner makes more applications of geometry in a week than a book-keeper does in a life time

and vice versa. Yet the assertion may be risked that, in the routine work of the great majority of trades, the skill in representation which is acquired by a mastery of industrial drawing is worth more than the skill in computation acquired by the study of the higher mathematics, arithmetical skill being assumed in both cases. The number of tools used by workmen in determining lines, compared with those used in computing, tells the whole story; for while the stump of a bad pencil suffices for the latter, there are for the former the straight-edge, chalk line, rule, square, level, plumb, gauge, dividers, tape and chain. Where a mechanic spends five minutes in making figures, he spends fifty in laying off lines. So that, if we regard practical mathematics as a useful tool, skill in representation has a greater cash value to him than skill in algebraic computation; and, therefore, in his education greater prominence should be given to the mastery of lines than to that of symbols. The same conclusion will be reached if we regard the relative effect of the two branches as educational agents. In the routine work of the trades, a far greater use is made of the perceptive faculties than of the reasoning powers, as may be seen in the value of experience to the mechanic. This value consists in the fact that his future work will, in the main, be but a repetition of that heretofore performed. Having once learned the best way of doing a thing, his daily task calls for the repeated application of that method rather than for the reasoning out of new methods. As a rule, literary colleges have paid no attention to the art of using lines, as distinguished from a scientific study of the capabilities of lines; hence, mathematics has been chiefly employed for the education of the reasoning and not of the observing faculties. Less provision has been made for the training of the eye than of any other organ; although, in the great industrial world, it, as the chief organ of perception, is used even more constantly than the hand; in fact, is the pilot of the boat who rings orders to the latter as engineer. A trained eye is as valuable to the artizan as is quickness in calculation to the merchant, or quickness in the detection of a fallacy to a lawyer. Hence, proficiency in the principles and practice of drawing, as used by the artizan, is time saved and money earned. And even in those vocations where no direct use is made of drawing, such as that of the job printer and milliner, the greater purity of taste and correctness of eye which are inseparable from such proficiency, will command a cash price in every market greater than the cost of acquisition. A workman in any trade

who possesses a cultivated taste will rise more rapidly, and command higher wages, than one not so trained; because real beauty, whether of a coffee pot or a cathedral, consists more in grace of outline than in ornamentation, costs less than ugliness, and sells better. Two notable instances of the cash value of industrial taste are furnished by the experience of English and American manufacturers. Twenty-five years ago, England found that her wares, equal in every other respect to those of France and Germany, were being driven from European markets by the greater beauty of the latter. In other words, the seemingly trifling item of hereditary ugliness was so seriously affecting her great manufacturing and mercantile interests as to demand action. After due examination, the government made provision for the compulsory teaching and study of industrial drawing in all its schools; and the factories were speedily supplied with artisans who competed successfully with those of Europe. Five years ago New England manufacturers found themselves in the same position, because of the deficient taste of workmen; and Massachusetts applied to the English government for the most competent of its teachers, to serve as state director of industrial drawing in her common schools. The result was the importation of Prof. Walter Smith, whose rare ability, sturdy courage and square shouldered contempt for water colored humbug and wax work bosh have placed the future workmen of many states under lasting obligation to Bostonian sagacity.

It is claimed that the study of mathematics, as commonly taught in literary colleges, has peculiar virtue in disciplining the mind; and, therefore, that a departure from the beaten path will be disadvantageous to the student. As the same position is held in regard to the classics, both may be considered at once.

The usage is to teach pure as distinguished from practical mathematics. So far as this usage has a purpose, and is not a mere obedience of established custom, its chief design must be to train the mind; because, as a rule, no application to business employments is made of algebra, geometry, trigonometry, conic sections or calculus, with the single exception of surveying. What use is made of the knowledge thus acquired? A rare enthusiast becomes an astronomer; a select few become professors, to lead other students over the same path, or authors who add an eleventh way to the ten ways already known of solving a problem that is not industrially used twice in a century; while the rest either forget the higher mathematics, or enter technol-

logical schools, or return to the study of arithmetic, not as taught in colleges, but as used in the shop, office or bank. Unless the labor of these years has paid in greater mental vigor and precision, it has not particularly paid at all, so far as the vast majority of graduates are concerned. And when one of these engages in business he is apt to discover that fellow clerks who spent in the counting room the months which he spent at college, work more accurately and deftly, and continue to command larger salaries. Be the worth of this mental training what it may, two things are noticeable: first, that the graduate must still serve an apprenticeship in acquiring skill in the use of practical mathematics; and, second, that business life is itself an intellectual gymnasium which develops mental strength, quickness and precision quite as much as does the usual college course. The most successful business men of America are not college graduates. The great mass of those who to-day guide the manufacturing, railway, commercial and political interests of the nation never studied the classics or higher mathematics. One of two inferences is fair: either that the ablest boys were not sent to college, or that the drill of business life disciplines the mind as well, for all practical purposes, as that of a college. Many persons speak of education as if they meant graduation, and as if only those were educated who have graduated from some college. When the Creator ordained "In the sweat of thy face shalt thou eat bread," He endowed and equipped a world's university, in which, through divine processes and impelled by resistless forces, pupils obtain a very practical training that somehow enables them to bear away from collegians the greater number of the esteemed prizes of life. Whether this training be an "education" or not, it serves the same purpose in all the vocations except the professions, and in them to a greater extent than many suppose.

We are not denying the proposition that a study of speculative mathematics and of the classics disciplines the mind. It undoubtedly does: but so does everything else that equally causes the pupil to *use* his mind. Neither a problem nor a Latin sentence, in itself, increases the ability to think: it is the *thinking* which one does in solving the problem or unearthing the meaning that, by the universal law of practice, makes the mind stronger. And we submit that the mastery of practical mathematics as really necessitates sturdy thinking as does the ordinary study of pure mathematics; that the knowledge gained is worth more to a greater number of persons; that, since mental dis-

cipline is given by all actual studying, the pupil who lacks money or time cannot afford to take any study simply for its disciplinary virtue; and, that what an industrial education may be supposed to lose by its substitution of practical for pure mathematics, and of the English language for fancy and impure classics, is more than made up by its employment of other disciplinary agents. Professional educators are in danger of overlooking the amount of mental discipline necessarily involved in acquiring many of the arts and trades. When a boy is able to read Cæsar he has done a given amount of thinking and gained corresponding mental power. A boy who, beginning with the telegraphic alphabet, becomes able to receive by sound and reduce to writing an average of twenty-five words a minute, has done as much hard thinking as the former; his attention, memory and power to think exactly and rapidly have been more severely exercised, and his percentage of gain cannot be less. In his subsequent growth from a "plug" to a first class operator, the amount of mental discipline will be fully equal to that given by the study of Latin in the transition from a freshman to a senior. Such an operator can readily command \$1,500 a year. Or, take the case of the printer. Does his hand fly to just the right box of the one hundred and fifty-two, at the rate of seventy-five letters a minute, without any antecedent discipline of the mind? Is correctness in capitalizing, spelling, punctuating, dividing and justifying obtained without hard and constant thinking? Is there less mental discipline in a mastery of the art of job printing than in the study of Latin prosody? It is safe to say that in a match between all the graduates of American colleges, on the one side, and all the printers of America on the other, each man to furnish copy for one column of matter, the mistakes of the former would far outnumber those of the latter. And if the study of English and cognate languages disciplines the minds of the former, must not the drill of a printing office discipline the minds of the latter? Can any booby shoe a horse, or build a carriage, watch, house, arch, bridge, engine, or compound a prescription? It is probable that when experience shall have determined the best combination of literary and industrial appliances, a greater mental ability, as well as more useful knowledge, will be the result. So far as muscular strength is concerned, it is immaterial whether a Yale boy trains at the oar or a Kansas boy trains at the anvil, provided the same power be acquired; though the latter can earn a living and the former cannot. And so in regard to mental

discipline; the real question is, How much mental power can the graduate exert? and not, How long was he in training, or under what system?—though the graduate may find that ability to do things which people want done pays better than ability to do that which nobody needs performed.

Industrial institutions cannot afford to follow in the beaten path of mathematics. They must have text books written to meet the necessities of industrial life and designed to make the student skillful in the use of mathematics as a tool. Until such works are prepared, the handbooks of the several trades are safer guides to the teacher than those written for the purpose of re-establishing each step by which principles have been reached, and of illustrating minute details by problems that are as useless as Chinese puzzles, and far less amusing. Every problem suggested by the requirements of industrial life has been solved and formulated; and the simple question is whether the student is to be empowered to make an intelligent use of the labors of the best mathematicians of centuries, or whether he is to be so educated that he could replace the formulæ needed in business in case all mathematicians and books should be suddenly annihilated. The cost of preparing industrial students to meet such a danger is far greater than the danger itself. Of course, the opposite extreme of simply qualifying the pupil to translate a trade formula is equally to be avoided. Were nothing more than this necessary, his education would be finished when he had procured a hand book. He should as thoroughly understand the mathematical principles applied in his business as a stock raiser should understand the laws of breeding; but it is no more essential that the former should master principles only used and applied by the astronomer than that the latter should understand the anatomy of the mastodon.

In most of the arts and trades, a knowledge of some branch of physics or chemistry ranks next in usefulness to that of practical English and practical mathematics, and should be taught accordingly.

Familiarity with the laws of light and skill in the manipulation of shades and colors have special worth to the painter, frescoer, engraver and photographer. The mason, builder and machinist should under-

stand heat, as it acts upon air in the draft of flues and ventilation of houses, or in the shrinking and warping of wood; or as it acts upon water, upheaving foundations, disintegrating rock, or furnishing the great motor steam. Water itself, either as a driving power or as a solving and cleansing agent, has an interest to the artizan equal to the use which he makes of it. Electricity has its special value to the operator, metallurgy to the worker in metals, economic geology and botany to the engineer. As numberless as the vats, laboratories and furnaces of the industrial world are the combinations of physics and chemistry; and the subject need not be further developed. It is evident that the same course of instruction cannot be equally valuable to all the arts and trades, or go far until the several lines must diverge from the trunk. The path for Engineers will extend beyond that for cabinet makers, and the one for druggists will take a different direction from that for printers.

It is not necessary to consider what is conveniently but vaguely known as a "business" education. The kind of knowledge and skill required will be determined by the demands of the specific business. Nor is it necessary to show that the measure of general knowledge which any of these courses may legitimately embrace depends wholly upon the circumstances of the student. We have been discussing a direct education for those who are forced to obtain, in the briefest time, the ability to earn a livelihood by some industrial vocation. Their subsequent investigations may include all the fields of knowledge and occupy a life time. If it be objected that this direct education is narrower than the professional one, and, therefore, will furnish narrower men, we reply: that the study of the works of God, through the sciences, must broaden the mind more than a study of the writings of men, through the dead languages; that the great mass of workmen are practically excluded from literary colleges to such an extent that the destruction of these colleges would make no material difference in the individual intelligence of industrialists; that this direct education will qualify a man for his vocation, and make him as broad as the requirements thereof; that the vocation of the builder or merchant is as liberalizing as that of the physician; that an education which enables a man to earn a living is better than one which does not; and that the establishment and prosperity of scientific departments in such conservative institutions as Yale, Harvard and

Princeton, show that the best educators are adopting the principle of a direct in preference to that of a roundabout education.

By an act of the Legislature this Institution has always been open for the education of females.

The world is so full of genuine women, guided by the noblest principles, and evincing an almost desperate eagerness to earn an honorable living for themselves, parents or little ones, that the necessity for an education different in this respect from that usually given to girls must be apparent to all. If viewed from the standpoint of actual instead of ideal life, the course of study followed in the average female seminary will logically appear as a standing wonder. It has been so long in use that the principle upon which it was built, and the end it was designed to attain, may fairly be inferred from the results actually produced. Apart from an effort to discipline the mind, which can be as well done by the acquisition of useful as of useless knowledge, its chief purpose seems to be that of furnishing intelligent playthings for men possessing exhaustless wealth. Judged by its fruits, it evidently assumes that a woman's work mainly consists in discussing literature, smattering French, executing operettas and attempting to copy paintings without a knowledge of drawing. It assumes that the girl will not marry: or, if she does, that the strain of maternity will not test her constitution; that her children will never be sick; that her family will be oblivious to bad bread, worse coffee, and household confusion; that a flowerless garden will fill her husband with bliss, and a buttonless shirt with ecstasy; and, above all, that she will never, through any adversities, or under any conceivable circumstances, be required to perform any possible kind of work! The world for which it prepares her is Dreamland, where the poetic Charles Augustus awaits her arrival that they may sail in a fairy ship over a placid ocean to his castle in Spain, and spend a perpetual youth in delicious wooing while the ceaseless moonlight sifts through overhanging leaves and exotic flowers perfume the air. Charles Augustus is a fraud! His true name is John Smith. He lives in Kansas and earns every

cent by hard labor. He tears his clothes, snores, and eats unlimited quantities of pork and cabbage, which Mrs. John Smith may have to cook, and, at the same time, preserve order among an assorted lot of little Smiths, energetic with mischief and having capacious lungs and elastic stomachs. It is not strange that the seminaries provide the usual course of study, for, like other merchants, they only supply the article demanded by the market. But it is strange that a mother who was herself so educated, and who, as a wife and housekeeper, has keenly felt her own ignorance of subjects that should have been taught, and her want of skill that might have been acquired, can be content to give her daughter the same unreal preparation for that which she knows to be very real life. And it is exceedingly strange that fathers, long familiar with the distress suddenly wrought by financial changes, should religiously exclude from the daughter's education all knowledge of business, and every possibility of earning a woman's living except by the wash tub, needle or piano.

It is impossible to determine just what work a given woman will likely be required to do, and, therefore, impossible to decide just what knowledge and skill the girl should most seek. Ordinarily, she will marry: yet so various are the duties imposed by matrimony that this fact does not settle the question. Some wives are lifted by the husband's wealth above all household care, except that of general superintendence. Others, nobly impelled by love, are from the outset efficient co-laborers in acquiring the common property, his occupation deciding the kind of work performed by her, whether in the kitchen, dairy, office or store. Still others, whose husbands become helpless through sickness, dissipation or chronic worthlessness, are gradually forced to support the family by their own labor. While every person is acquainted with one whose girlhood was spent in luxury, whose education was exquisitely "finished," whose married life was free from all business knowledge or perplexity, suddenly hurled by the husband's death, with a bankrupt estate and a group of nestling children, to battle against the trained cunning and steeled avarice of soulless men for the mere crumb that prevents actual starvation. Without raising the vexed question of woman's rights—whether the family is her proper sphere, or whether it be as broad as her success in professional and political life can make it—she undoubtedly has a right to be educated as a woman. She is not a man any more than a lawyer is a physician, and is as fairly entitled to special instruction as are

they. The girl has a right to an education as precisely adapted to a woman's work as is the boy's preparatory to man's work.

She has a right to study her own organism and functions, to understand the conditions of health, and to be forewarned against the inexorable penalties of ignorance, folly or over-taxation. She has a right to instruction respecting the proper care of the sick, for a mother's watchfulness and a wife's tenderness, when intelligently directed, are more potent than drugs in the struggle with death. Not that she is to receive the physician's education, for we are not speaking of the physician's work; but a woman's education for that divine work which woman has always performed in every race, and will perform so long as there are moaning children to soothe and fevered brows to cool. She has a right to instruction and practice in the art of cutting and making her own clothing tastefully; in the art of cookery; in that of setting a table, brightening a room, beautifying a garden; in short, to all the knowledge which related sciences can contribute to her intelligence, deftness and efficiency in that greatest and purest of womanly arts, the art of making home brighter to the little ones than streets, more attractive to its adults than saloons—a quiet nook whence the pilgrim of three score and ten boards the ship that sails out into eternity's ocean. These are things which men cannot perform. Since the world began, and because of the division of labor ordained before it began, they have distinctively belonged to woman as woman. Her patent to them is freshly written, generation by generation, in the full promptings of her own nature. Her commission to do them issues from a higher authority than that of fashion, ambitious fancy, or the ignorance induced by a traditional education which has created a greater distaste for home duties than any other one element.

It is difficult to indicate precisely and fully the various kinds of work which naturally fall in this group; difficult to mark the boundaries which should separate it from those groups which are generally recognized as a woman's rightful work; and equally difficult to find for it a distinctive name. This difficulty may either arise from the fact that the proposed classification is false, or from the fact that the intended distinction has not been practically made, and the appropriate name not really needed. If the whole subject be stripped of the preconceptions which usage has wrapped about it, and if, at the same time, the warp and woof of the average woman's daily life be fairly examined, any one can see that there is such a group. For the want of a bet-

ter name, it may be termed the organic or primitive group of woman's work: and may be defined as embracing the numberless and varied operations that can be better performed by woman than by man because of her distinctive physical structure, or because of the modifications effected by that physical structure in the action of her mental and moral powers, as contrasted with the action of man's powers. Her superior skill in some of these operations is owing to the greater delicacy of her touch, as compared with that of man; in others, it is due to the nicer adjustment of keener intuitions and perceptions; while in others it is the inherent force of a deeper, finer and warmer affectional nature, which, like the ocean's tides, sweeps almost without effort or consciousness on her part. In this group are to be placed all tasks, demanded by the interests of a broad humanity, for the doing of which woman, just because of her very womanhood, has a greater natural aptness than man; and, in addition to the things which she can now do as well as he, those which, if equally trained, she could do with less effort, and, therefore, cheaper and better than man. The powers and capabilities found in this cluster will extend into other groups, to be presently mentioned, since a woman's work is as indivisible as her life. Thus, her physical dexterity may be used in the practice of a trade for the earning of a livelihood; or her mental ability be exercised as a brilliant conversationalist or a successful authoress. But these are things which the average man can do as easily and well as the average woman. Therefore, we draw the boundary between the organic and all other groups of a woman's probable work through the points where that natural aptness, which is rooted in and grows perennially out of the distinctive structure and strength of womanhood, ceases to be greater than the natural aptness of man.

Such a classification may conflict with prevailing views, and meet the consequent opposition. Nevertheless, the principle upon which it is made seems to be natural, logical and correct, since it is a recognized truth of political economy as old and vigorous as the plans of God and men, as will be seen if presented in this form: Here is a certain amount of world work to be done: here are laborers with different powers: which of them can perform certain parts of this work with the least waste of strength and time? It may also be found that the logical application of this classification will ultimately award to women some vocations, both literary and industrial,

which are commonly pursued by men; and objection be made to it accordingly. Women receive lower wages than men, not because they do less or poorer work, but because the vocations now open to them are densely crowded by those who must labor at any price or starve. And he is very much of a brute who would rather see pure women driven by impending starvation into the ranks of cancerous prostitution than to see this pressure relieved by the opening of new avenues to their virtuous self-support, even though such a measure should offend his personal prejudice or subject him to personal competition in business. But, aside from this consideration, the world has a moneyed interest in the matter. Perfumers imitate the fragrance of the flowers, and musicians the notes of the birds; still, as a question of cost and success, the violet and canary, because of their distinctive structure, work easier and better than their copyists, giving to the world greater pleasure at cheaper rates. And, while the perfumes of the druggist are, perhaps, better than none, the world cannot afford to abolish God's originals for the profit of the imitators. No more can it afford to ignore the womanly power of woman. Not until druggists will, with their essential oils, perfume the air of a county as generously and cheaply as the fruit trees in blossom-week freight the air of a state, can the world afford to pass by the superior ability of woman to do many needed things, just as birds sing and flowers distill fragrance. So that on the ground of personal interest, humanity cannot afford, either through thoughtlessness or because of the traditions of an abnormal education, to withhold from the girl a special training for that organic work which belongs to all women, be they married or single, intelligent or illiterate, queens of fortune or queens of industry.

Whether such an education can be provided is a question which fairly admits wide difference of opinion. While the operations classed in this group, as distinguished from others, necessitate the use of both mind and body, they require a greater exercise of physical skill than of mental ability: and the education must proportion its manual drill and mental instruction accordingly. So that the question reduces itself to this: Can the truths of science which bear upon woman's organic work be arranged and taught to the girl with direct reference to the use which the woman makes of them, and can the practice by which skill is acquired be given?

So far as the simpler operations are concerned, all will concede that such an education is practicable. There is no greater difficulty in

shaping knowledge for the benefit of the housekeeper than for that of the farmer or surgeon. In fact, some of the more essential sciences and arts are so shaped and taught in this Institution quite as successfully as for any other purpose, such as physiology and hygiene; sewing and dress-making; book-keeping and business law; physics and chemistry, as applied to household economy; and botany, as used in vegetable, flower and landscape gardening. At the earliest practicable date, instruction and drill will be given in cookery, housewifery, butter and cheese making, poultry and bee keeping. Most of these will be taught, not simply as means of earning a livelihood by the woman, but as matters which deserve to be a part of every girl's education quite as much as do algebra, Latin or music. To this extent the question is evidently only one of determination, money and time.

But the definition made of woman's organic work embraces other and rarer operations than those just indicated; so that the corresponding education must ultimately include other instruction and practice. Nor can any one precisely determine all the vocations for which woman has a greater natural aptness than man, or now designate all the pursuits which she would successfully follow were she properly prepared, and unforbidden by the voice of society. These points can only be settled by actual trial under circumstances different from those now existing. So that if the subject be viewed from this standpoint, and if the question be whether an education corresponding to the whole of a woman's organic work, as defined, can now be given to the outer line of its possible extent, all will concede that it cannot. Not only are competent teachers wanting and text books lacking, but some of the paths logically indicated are yet to be surveyed and made passable. This task belongs to future educators, impelled by the demands of their day. But, while shrinking from none of the legitimate consequences of the position taken, it is certainly unwise in us to turn a deaf ear to the voice of common sense, and to the demands of the present, because of a confessed inability to trace all the wants and supply every possible demand of the future. It may yet be many years before even the best ends to be attained by a woman's education shall have been finally determined, or the best methods of securing these ends perfectly adjusted. Still, nothing can be lost, and much may be gained, both in the present and for the future, by seeking to clearly define the line of a woman's nature; by endeavoring to develop her powers and capabilities along that line, so far as now feas-

ible; and by shaping the knowledge taught and the practice given with controlling reference to their actual use in the probable work of woman.

The expediency of so doing is not affected by the limits which are variously assigned to woman's sphere. For, upon the supposition that the professions as legitimately belong to woman as to man, it certainly is true that the lawyeress is a woman before she becomes a lawyer; that she never ceases to be a woman; and that, though her professional success be unequaled, she wins it all by the exercise of a woman's physical and mental power. Nor can she ever, by any determination or any training, change either her nature or the laws under which it acts. Hence, let the direction and extent of her professional education be what they may, the necessity for her education as a woman will still remain, and, so far from being ignored, should be laid as the foundation of the whole superstructure.

On the other hand, many persons hold that woman's sphere does not include the professions: and the fact is, that only the smallest number of American women enter them. What is the sense, then, in giving the girl and the boy the same education? If preaching the gospel or practicing law is the natural work of woman, then certainly the girl should be taught exactly the same things and be drilled in exactly the same way as are boys who prepare for these professions; but if not, it is hard to see either the necessity or fitness of putting her over precisely the same course. At any rate, those who advocate this proceeding should be the last to complain because a young woman, finding that she can best use her acquired knowledge in the practice of a profession, acts just as does the young man, and invests her capital where he invests his. She has exactly the kind and amount of money possessed by him; and if the practice of law is a wise investment for him it must be equally so for her. Why give your daughter the training of a professional actress if you intend to object to her appearing on the stage? When forced to earn a support, where else can she profitably use her powers except in the glare of the foot lights? If Mrs. Grundy is shocked by hearing a stentorian sneeze from her super-refined daughter, let that estimable matron stop putting snuff in the delicate nostrils of the lovely being. There is something ludicrous as well as illogical in rushing a girl through the mathematics only useful to the astronomer; the Greek only valuable to the preacher; and the fancy things which are not especially valu-

able to anybody, before making her skillful in doing the things which ninety-nine of every hundred women are called upon to do day by day, and which the remaining one may have to do at any hour. Should the girl never use this latter knowledge, she would be no worse off than the great mass of those who graduate from female colleges, for they rarely use what they have been taught. But, on the other hand, if, instead of the elegant and fascinating Charles Augustus, who, growing weary of waiting had long since married Hortense, she should marry the energetic Thomas Brown, jr., it might easily happen that such knowledge would be very useful in the management of both Tom and his finely improved farm.

The second natural group of a woman's work is that arising from the probability that she will marry. This probability does not depend upon the dictates of fashion, or upon any degrees of wealth or intelligence. It is rooted in her very nature, and springs as spontaneously from her womanhood as does grace from the nature of God. Those who remain unmarried are the exceptions; and, perhaps, the peculiarities which are regarded as inseparable from spinsterhood are not to be ascribed to the state of non-marriage but to something peculiar in the nature of the spinster, of which non-marriage is itself the result. And an education that seeks to follow womanly nature, and to prepare the student for the realities of womanly life, must certainly be governed by a probability so great that it becomes a certainty in the vast majority of cases. In the first group were classed those operations which require a greater exercise of physical than of mental power. In this one may be placed those which require greater mental or moral than physical ability. The distinction between the two is illustrated by the difference between the work of the printer and that of the editor. Each employs both the body and mind, but while the printer chiefly uses his fingers the editor chiefly uses his intellect. It is evident that instruction in those sciences which mainly relate to the physical work of woman, together with the manual drill, falls naturally in the first group; and that, if the education has been fully given and taken, the girl will be prepared for such duties of matrimony as require physical rather than mental ability. So that this group, by distinction, must chiefly concern itself with the instruction designed to prepare woman for exercising that mental, moral and affectional power demanded by the work of the wife and mother.

For the purposes of analysis, it is well enough to resolve woman

into the component elements of body, mind and soul, and to consider her education with reference to the functions of each; yet we must be careful to put the elements together again in the shape of a living being, and to regard her education as a unit. Such divisions are theoretical, not actual. A woman without a body is dead, and no man marries a corpse. A woman without a mind is an idiot, and such a wife, no matter how brilliant her beauty, cannot retain a husband's love. A woman lacking moral nature is a fiend, and not until physical pain becomes as agreeable as pleasure will men knowingly marry fiends. The vitality of true marriage is love, and the vitality of love depends partly on the physical, partly on the mental and partly on the moral nature of men and women. Hence the natural action of each and all the elements is essential, and if either fails to do its proper work disappointment will strangle contentment. Love cannot continue where confidence is lacking; nor confidence where respect is wanting; nor respect where there is an absence either of truth or of a reasonable performance of any natural duty. As no sensible woman could really love a brainless Dundreary, so no sensible man can love a wife whose mind is as flabby and forceless as a jelly-fish. Without seeking to determine the relative importance of woman's physical and mental power, and while insisting that both are absolutely essential, it is clear that a large part of wifely work requires for its performance the best action of her mind and soul, and, therefore, that they should be developed and trained to the fullest practicable extent, and in the best way.

How shall this be done? What are the best lines to follow, and what the best means to use? Is the course pursued in the education of professional men therefore the best for the education of women; and are the agencies employed for disciplining the minds of the one therefore the best for the other? Evidently, this depends upon whether woman's mind is the same in substance and degree as that of man; and, if so, upon whether it acts under the same laws, and produces similar results in the same way.

A moment's thought will show how greatly the average mental work performed by woman differs from that of man, not in quantity or quality, but in nature. Imagine woman reduced to a physical toy, or to a mere operator of machines, would humanity lose anything of intellectual value? Perhaps not a great deal from the departments of medical, legal and theological research; nor from those of philosophy

and statesmanship. Likely, as many volumes having enough vitality to live a century would be added to these sections of the world's library as now. Perhaps, also, mechanical invention would progress as rapidly, the great streets of the world's commerce be as thronged, and the smoke trails of ships and trains be as numerous. Something would be missed from the studios of art, those laboratories of imagination, feeling and taste; and much would be missed from the purest, most heartfelt and ennobling literature of the age. But how about those mental laboratories, vastly more numerous than the combined factories, stores and offices of men, dotted and clustered through the land as the stars in the sky, and as ceaseless in their work as these in their shining: how about the *homes* of the lawyer and scientist, of the manufacturer and merchant, of the banker and farmer: would these be the same? Would men have the same inspiration in their daily toil? Would the philosopher be as real a philosopher without the smile of his wife; or would the defender of right and assailant of wrong be as brave and enduring were it not for the little eyes that sparkle around the evening table? Would there be as much truth, integrity, virtue, courage, patience, nobility, as much of God in the world? And yet these things are worth something to humanity; as much, perhaps, as are logical tomes, scientific icicles, or deeds, stocks and coin. These things are woven by the mind and soul of woman, as are philosophies by men. It is true that there never has been, and likely never will be, a female Bacon, Newton or Napoleon: but it is equally true that there never has been, and will never be, a male Florence Nightingale, Martha Washington or Cornelia. Because, forsooth, we cannot measure truth with a yard stick, let us not deny that truth exists; and because we cannot measure woman's mental work by the same gauge that we apply to Bacon let us not deny either its existence or value. The very fact that we cannot, shows how greatly the intellectual product of woman differs from that of man. To deny that the woman is as much a mental worker as man, is to deny the long, plethoric years of wifely tenderness and of motherly watchfulness, counsel and prayer, without which the world would become a lair of wild beasts. It is not so much her physical work which most endears and makes hallowed the memory of mother: that serves only as a goblet into which the mental, moral and affectional forces of her whole life distilled a spirit nearest like that of deity; and we instinctively lift it to our lips in moments of worship, when wealth, fame and ambition seem as pro-

fanities. The greater our distance from childhood the more clearly do we see how different in its nature is the mental work of the mother from that of the father. And the more thoroughly we analyze the intellectual labor performed by woman in all her relations, the more apparent will be its difference from that of man. Men may fancy that they do a given thing as a woman would, but any bevy of girls could easily demonstrate and enjoy the absurdity of the fancy.

Now, suppose the Creator to have acted only as wisely as do human inventors, it is probable that he as expressly designed her mental organism for the performance of her distinctive mental work, as is her physical organism exactly adapted to her physical work. And if her mental work differs in nature from that of man, it may be antecedently probable that her mind differs in nature from his, just in the degree that the work of each requires, for its best performance, either different faculties or different strength of the same faculties. From this stand point, the question whether her mind is equal to his bears a wonderful likeness to the question whether a lark is equal to a trout. Both were made by the same hand, out of the same chemical substances, though in different proportions; yet, as a swimmer the lark is a failure, and as a flyer the trout is a fraud. Each has its own work, and each its own instincts, adapted precisely thereto. And while we can more easily see the difference between swimming and flying than between the action of woman's mind and man's, yet it may really be no greater. We are not asserting that the substance, so to speak, or nature of her mind is different from his, or that in quality or quantity it is either superior or inferior. No one knows, or can certainly know, whether either of these suppositions be true or false. Nor are we claiming that woman's faculties have a different proportion from those of man; though some facts may seem to confirm the antecedent probability.

But, if none of these propositions be correct, then, in order to account for the difference between the mental work performed by woman and by man, we submit that the action of her mind is so modified by her physical structure that, either it does a less amount of work, and, therefore, has not the same power, or else it works in a way of its own. All admit that the action of man's mind is affected by the condition of the body: a fever, for example, wholly deranges mental action. It makes no difference whether the fever be the effect of internal causes, as malaria, or external causes, as torture; nor whether the

causes be themselves the results of physical organization, or otherwise. In either case, the disturbance of the mental system will correspond to that of the physical system, and the quality and amount of mental work will be in proportion to the degree and extent of the disturbance. During the greater part of woman's life there are physical causes which inevitably must and actually do affect the brain, and, therefore, mental action. And the fact that these forces are organic and periodic, so far from showing that they produce no effect, only shows more clearly that they must inevitably exert a sure and proportionate effect, which cannot but appear in the action of her mind. If it be claimed that, as these causes are natural, corresponding compensation has been made in the structure of her mind, then, this is to say that her mind is organically different from man's, because physical condition always affects mental action; and, if her mental constitution is different, her mental education should be proportionately different. But, on the other hand, if it be claimed that her mind is constituted as his, then it must act in a way of its own, that is, under different laws; and, therefore, her education should be proportionately varied. The presence and activity of disturbing forces in woman, that do not exist in man, cannot be denied; nor can their necessary effects be denied. Hence, so far as educational lines and agencies are concerned, it is wholly immaterial which of these alternatives be taken.

In the light of physiological facts, it would be most surprising, indeed, if the action of woman's mind were the same as that of man's, supposing its nature to be the same. She has periods of mental rest, inexorably enforced by a weakened brain; while he has none. She probably has intervening periods of clearer, freer, higher action than he; for every wave-hollow has its crest, each sleep its waking: because, what is termed the "intuitiveness" of woman, as compared with the slower "reasoning" of man, can only be accounted for upon this supposition, or upon that of a different and more perfect mental organism. An accurate comparison of the mental work performed during a year by one thousand women, with that accomplished by one thousand men, would probably show that the type-woman thinks as much, as skillfully and as effectively as does the type-man. If both were placed at the same task, it would likely appear, also, that each would use different methods, though the result might be the same; and that her processes would reveal a keener perception of the exact facts in the case, a readier acceptance of truth, a firmer trust in the active power of

truth, a more fertile imagination, and a finer tact; in short, mental action infused and impelled by more of that which is greater and stronger than mere reason—soul! At least, these qualities seem to be indicated by the general workmanship of woman. And, if the average woman equally accomplishes her purposes by taking fewer logical steps than does man, it may, after all, be just as well; certainly for her. Though near-sighted persons find glasses of great value, it does not follow that all eyes need them, nor disprove that some would be injured by them. - So with respect to certain educational agencies; while valuable in the training of men, they may be both useless and hurtful in that of women. But, let the comparison show what it might, it is undeniable that the action of woman's mind is characterized by periodicity and intensity; whereas that of man is marked by continuity, evenness, and, perhaps, by greater breadth. Details and results seem natural to the one; classification and causes to the other. A woman intuitively sees every visible fabric, shade and ornament worn by each profusely dressed lady met in a crowded street, and will need many minutes to describe the perceptions of a single glance; her mind acting as the camera, which at the same instant images each tree, twig, and grass blade of a whole landscape. It is doubtful whether any training would give men the same degree of power, or enable them to exert it with as little effort. On the other hand, it is doubtful whether she as often asks, or cares to know, *why* things are so; or as naturally seeks for the principles about which to group facts. In her mind perception and feeling seem naturally dominant; and in his, reasoning. If it be claimed that all this is the result of a different education, we ask for the proof of the assertion. The mental action of the uneducated classes shows the same characteristics. And if it be said, that this is itself an indirect result of the influence exerted by the educated classes, then, the skill and taste of the squaw woven into the buffalo robe, as compared with that of the warrior, or the mental adaptedness of the female slave to house work and of the male to field work, equally show that these differences spring from something back of education. And it is clearly immaterial whether they arise from a distinct mental structure, from the action of the same structure modified by physical causes, or from education. The fact that there is a practical difference of some sort seems undeniable, be the cause one thing or a dozen.

The educational system is based upon the idea that the mind, like

the body, grows upon what it eats, and is strengthened by exercise; and, that some kinds of knowledge are more nutritive to one faculty than to another, or give better gymnastic drill. Thus, the imagination is enriched by familiarity with the best poets; the perceptive power is strengthened by the mastery of those sciences requiring the closest observation, and the reasoning power by the labor of welding link after link in a mathematical or logical demonstration. Supposing the idea correct, should the same mental diet and exercise be given to the girl that are prescribed for the boy? What is to be aimed at in her education? Is her mind to be made as much like his as possible, that she may perform his work; or, are her faculties to be developed along their own natural line, that she may perform a woman's mental work in the best way? In other words, do we want to develop manliness or womanliness in woman? If the former, then her educational regimen should be the same as the boy's; if the latter, it should be determined by its supposed effect upon the faculties sought to be strengthened: in each case, due respect being paid to the periodicity of her mental action.

Apart from bodily structure, is it advisable to have mentally-male women any more than mentally-female men? Does either man or woman desire to marry a mental, any more than a physical, counterpart? Would there be as much pleasant variety in the home, were it an exact intellectual repetition of the street, and were the same facts viewed from the same stand point, and argued, in the same way, to the same conclusions? If so, men would only associate with men; and home would become merely a continuation of the day's business. The truth is, that man craves something intellectually different from the foil and thrust of daily life, as does the woman something different from her routine; and this craving of nature protests alike against intellectually masculine women and feminine men. Or, would posterity be the gainer by the transmission of identical mental qualities? If so, family intermarriages would not be physiologically prohibited by the death penalty of insanity and idiocy. Individuality is the law of nature, everywhere stamped on matter and mind. Without it, variety is impossible; and nature abhors monotony. Identicalness only characterizes the articles turned out by machines which man builds; never those from machines which God builds. The mechanicalness of the attempt to make the mental woman an exact copy of the mental man clearly indicates that man, not God, originated it. It is the twin

brother of the mechanical garden ; in which, nice little beds, straight-sided and right-angled, are separated by lean little walks cut off, in lengths to suit, from the post holes of space ; and where wayward plants are perpetually clipped into primness, and the surrounding trees are eternally abused for not growing in line : all of which, every one can see, is a vast improvement on the valleys, hills and plains of a continent, with its winding streams, wild flowers, forests, and snow-veiled peaks ! However desirable that nature should be conformed to such a standard, it would cost a deal less to conform the standard to nature ; and, possibly, the world might be just as beautiful. Perhaps, in the matter of female education, as in that of gravitation, it may be as well for us to follow the laws of nature : certainly the tumblers will be fewer, the pain less, and, likely, the progress greater.

The system of female education prevailing in the United States has made a fair trial of the effort to develop the girl into a mental man. In common and graded schools, in academies, seminaries and female colleges, the same course of study has been adopted that is provided for the education of boys. And those institutions which most plume themselves upon their excellence, triumphantly cite the fact that their curriculum is that of Harvard, Yale or Princeton. What are the results ? Take their graduate who has studied as diligently, learned as rapidly, and assimilated as thoroughly as has the male graduate, and who has as fairly won an equal diploma, and there are many such ; what use does she make of the knowledge gained and the strength acquired ? At the end of ten years is she found in the same profession as he ? At the end of twenty years has she attained the same position ? At the end of thirty years has she proven herself a successful competitor in doing the same work as he ? Or if, impelled by a woman's promptings, she has performed woman's work, has she, on that line, attained the same relative eminence ? Is her husband as much happier than other husbands as her education was " better " than that of other wives ? Are her children healthier than other children ? Are her dishes more toothsome, her rooms more attractive, and, which is a fairer as well as more important test, is her home warmer and brighter with the glow of wifely love, of motherly tenderness, of all that constitutes the radiance of womanliness ? If so, where are the proofs ; just such proofs as can be culled from any University catalogue of alumni ? If this education is really worth anything, it will produce effects in proportion to its worth. If it is as

valuable to the woman as to the man, it will produce similar effects. And if it have only a tenth of the value which its advocates claim, certainly they should be able to cite the facts, specific and visible facts, not general twaddle. On the other hand, is any of the connubial discontent, more prevalent in these than other days, fairly chargeable to this system? Is any of the incompetency of body, incongruity of temper, or disregard of what was formerly considered the sacredness of the marriage vow, so frequently plead in our divorce courts, fairly attributable to it as an ultimate cause? How many of the germs of that decay which is visibly eating out the heart of domesticity were planted by it? Usually, the daughters of the wealthier classes have received this education in its purest form; and, usually, they have married those of equal affluence. Will the attending physicians testify that their wifely work is proportionately better done, and that a greater degree of motherly and womanly perfection is the rule of their homes? Would that the veil could be lifted long enough for us to determine the effects of this education, by a comparison of the lives of its pupils with those not its pupils; that we might really know how much, or how little, we are indebted to it for the physical weakness,* domestic incapacity, anguish, disease and death of wives; for the disappointment, sorrow, dissipation, adultery and maladies of husbands; for the enfeebled constitutions, stunted minds, frozen affections, mangled and distorted souls of children, which, fresh from the arms of the All Father, bright in promise and glorious in possibilities, have been murdered by the slow torture of womanly incompetence or neglect. Most admirable ladies and excellent brethren, let us gently press the spotless cambric to our lips, and turn from thoughts so unpleasant, and on no account let us enquire of physicians for the facts!

We by no means assert that all conjugal imperfection is due to this cause, and by no means believe that all girls so educated make worse wives and mothers than others. Thousands of happy homes, not only in great cities, but in villages and on homesteads, prove the contrary.

* See "Sex in Education," by Edward H. Clarke, M. D., Boston: Jas. R. Osgood & Co., publishers. We take the liberty of suggesting that the able author of this timely essay, to which we gladly acknowledge our indebtedness, discuss, from a medical standpoint, the question: Should the *knowledge* taught the girl, as well as the times of studying and modes of recitation, be molded by the peculiarities of her mental action? and, if so, how?—J. A. A.

But we do believe that the power of womanhood was stronger in such girls than that of the education, and that they became what they now are, not because of the manliness of their training, but in spite of it. In proof, is the very fact that they are in homes, and not in pulpits or courts; because their education directly fitted them for professional life, and unfitted them for womanly life in the degree that the one differs from the other; so that their performance of womanly and not of professional work shows the force of their education to have been less than that of nature. And the fact that they have made true wives and noble mothers is to be credited to their inherent womanliness, and not to the education, unless it can be shown that without the latter they would have failed in these respects; for any preparation it gave them for marital duty was, in a great measure, indirect and accidental: and it is to be charged, on the other side, with the knowledge it should have taught directly, but did not, and which they were forced to pick up afterwards.

If there be any one thing for which humanity should be especially thankful it is the wonderful vitality and reproductive energy of nature; and, if there be any one monitor which parents and teachers should more heed than another, it is what they term the "stupidity" of the pupil. Viewed from an educational stand point, stupidity has been, and will be, the preserver of the human intellect! It acts as do the bumpers of mental cars, which keep them from splintering demolition; or, as the elasticity of fluids, which prevents the granite cliffs of the understanding from being ground into ooze by the lashing waves of owlism. Stupidity may be adduced as an evidence of foreknowledge and compensating mercy, equally with the wing of the bird or the fin of the fish. It is to the mind what instinct is to the horse, which, though he be lead to water, delivers him from the sagacious and philanthropic destructiveness of the superior being man.

For generations the young have been placed in educational hot-beds, where regardless of individuality and requirement, all germs have been treated alike, and all seedlings sought to be forced by the same processes to the same size. No one questions the value of hot-beds; or the necessity for gardeners; but, are all hotbeds properly managed, or have either all gardeners or teachers attained perfection? When the florist finds that a desirable plant is not thriving, he tries to discover and meet the wants of its nature. Relying upon the skill of its creator, he regards its "stupidity" as indicating an error in his own work.

So, also, does the true teacher; and there are many such, justly meriting and receiving praise from which we would be the last to detract. But how much can the best teacher really effect under the requirements of the prevailing system of female education? It provides a standard bedstead, properly iron; and, heedless of the proportions of mental organism, pulls out, ligatures, or cuts off the several members, in an earnest endeavor to send forth the graduates as nearly uniform in length, breadth and thickness as untrollable circumstances permit. The fact that one student has a strong taste for plants, or animals, or chemistry, and a feeble power for abstruse computation, is deemed the best evidence that nothing short of a perfect mastery of all terrestrial and celestial mathematics can remedy the defect in his nature; and he is treated accordingly, to the necessary neglect of the dominant faculty of his organism. Another is found to have a vigorous imagination, or love for argumentation, fine art, or mechanism: are these developed as nature develops the physical organs? By no means; for order is the primal law of this educational hospital. It classifies these patients upon the basis of the amount of medicine they have already taken, as directed in the regular course. To all of the same class it gives the same diet and exercise, and does its very utmost to perform the same operations upon all. So perfect are its methods that the attending physicians can tell to a dot just what they will prescribe in any day of any month. Besides, for years and years, the greatest ingenuity has been exercised in devising exquisite instruments of torture, in the shape of text books, which are warranted to pinch a nerve a little harder, or stretch a leg an inch further than any previously used. For example, take the grammars which treat of the philosophy of language as a science, instead of the art of using language. The fact that each rule and exception in them can be perfectly recited by those who blunder hourly in their use of words, or for the want of words, clearly shows that they do not necessarily, or, perhaps, usually, give skill in the use of words as tools. Either botany, physics, or chemistry, if naturally taught, can be more readily mastered by the young student; and it is a debatable question whether Blackstone is more difficult to understand. At any rate, the assertion may safely be risked that there is not a Justice on any Supreme Bench in the United States who could to-day, and without special preparation, pass a creditable examination in the latest technicalities of grammar; and yet, are not these gentlemen adepts in the art of conveying exact ideas

by the employment of precise words? Were the United States Senate to apply to the Kansas State Board of Education for commissions as common school teachers, it is possible that not a single senator would receive a first grade certificate, and that many would receive none at all; yet do not these gentlemen know something about real life, its necessities, and the knowledge it most demands? We admit the difference between the work of the teacher and that of the judge, and heartily desire that instructors shall be thoroughly qualified for their work. The only point we urge is, that the knowledge of language which the judge uses is vastly different from the knowledge of language which the grammars set forth, and that of the two, the former is the most practical, and therefore the most preferable. It would not be so objectionable if the art were taught first, and the philosophy of the science, as explanatory of the art, were taught afterwards, when the mind of the pupil is more matured; but, judging by results, the majority of American students rarely attain skill in the art, either during college life or at the average common school. The system imperatively requires the attending physician to use daily just such instruments as grammar, which combine a greater variety and power of torture than adults realize; and it is not surprising if the patients suffer accordingly. Now, what force less than that of the vitality of nature itself could preserve the human intellect under such treatment?

The system is certainly bad enough for the boy even, with a mind stronger than a quartz mill, and a steadily sustaining body; but how much worse for the girl, with a mental organism more delicately constructed than any chronometer, and dependent upon a body that periodically varies in vital force? Differences of both mind and body, that are as marked as those between the birch tree and the rose, are wholly ignored. The same nutriment, discipline and stimulus are administered to all alike. Yet the average girl is a more conscientious student than the average boy. She is more sensitive to praise and blame; and is more ambitious, especially, when daily competing, on his own line, with one supposed to be her intellectual superior. By this system, her stronger perceptive power, so far from being trained as the florist would treat a lily, is "corrected" by pure mathematics and argumentation. Her faith-power, which accepts truth as the lung accepts air, is trained, not with the design of enabling her to discriminate between fact and falsity, but chiefly for the purpose of showing her *why* received

facts are facts! And the dominant power of her nature, that which most distinguishes her mind from man's, and which most constitutes her strength, beauty and glory—the power of loving truth just for its own sake; of freshly robing it in shining vestments of innocency; of crowning it with sparkling gems of purity; of breathing into it the very soul of glowing sympathy with the wearied and fainting ones in daily life—resting, vivifying, cheering them anew; this grand power, wrought of God, best translating God to men, and gentlest yet strongest in its wooing, is fed upon a diet of antique dates “—— A. D.” and “—— B. C.,” is exercised by fossilitic strolls with the vivacious ichthyosaurus; and sanctified by pensive meditations upon the untimely death of the noble megatherium, cut off, in the flower of youth, but a few billions of years since! Is it not surprising that so much of feminineness, and so little of masculinity, exist in these graduates? And can we do less than halt, in genuine admiration, before the grand reproductive energy of woman's mental nature, which, after years of such treatment, so easily regains its own line, and so quickly and perfectly forgets inutilities most laboriously acquired? Happy were they who were clad in the water-proof of “dullness,” and right cosy were they who nestled in the warm furs of “stupidity!” It is nature, and not the bungling, yet well meant, attempt of tactless men to educate girls into manliness, which we should gratefully thank for what remains of the womanliness of woman, and to which we must trust for its future growth and luxuriance.

Our answer has thus been given to the question, whether the course devised for the education of man for professional work, is best for the education of woman for woman's work as a wife and mother. We claim that this work is essentially different from man's; that it requires different knowledge and skill; that her mental organism is different from his, either radically, or in the mode of its action, or both; that it should be differently fed, nourished and exercised; that the practice of curbing faculties naturally dominant, by seeking to force others relatively dormant, is against the practice of nature in physical growth, and only submitted to by plants and pupils powerless to help themselves, and that its effects are sloughed off as speedily as possible when the treatment ceases; that the faculties should be developed in the proportion of their dominance, and as inseparable members of a completed organism, since, if one of the members suffer the whole organism suffers with it; that the controlling object should be

to develop the best power and skill of womanliness along the line of womanly nature, and that this line is the shortest as well as the easiest; that knowledge should be presented in the forms most grateful to the taste, and not pill-powdered with dust, or gritty with pounded-glass abstractions, or nauseous with cloying uselessness; that skill in a given art is more essential than a philosophic comprehension of its science; that no system of female education, guided by ordinary common sense, and really aiming to prepare the girl for woman's daily work, can be less illogical than the one now generally followed; that no mistakes made in any reasonable effort to determine the line of woman's nature, and to adapt educational methods and agencies thereto, can, by any possibility, be more wasteful of the pupil's energies, or more hurtful to her nature, than are those crystalized in, and daily perpetrated by, the prevailing system; that those educators and physicians who have paid the closest attention to its tendency and effects, are best satisfied of its unfitness for the coming generation; that it is continued in use, not because of its merits, but because the market, by the voice of usage and fashion, demands it; that it is a sham, a farce, and a fraud; that when the American press and the American public, guided by their own experience, and by the testimony of the best family physicians, who, because of a broader field of observation, are more competent witnesses than the professional educator, fully realize the nature, organic tendencies, and actual results of the prevailing system, it will be starved out of the market; that the defensive cry of the conductors of female colleges "Where is a better one?" will be properly answered by the response of parents, "It is your business, for which you are liberally paid, to find a better one!" and, finally, that a fair application of the above principles will furnish a better one.

The final group of a woman's work is that presented by the possibility or probability that she may be forced, by circumstances heedless of sex or position, to follow some industrial vocation as a paid laborer.

To furnish an education that will prepare the girl for such labor is clearly the main purpose and chief function of this Institution, so

far as females are concerned. It was endowed by Congress "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life;" and the whole Act, as well as the debates, shows that not "the learned," but "the industrial" professions were intended, and that the design was not to educate the industrial classes into general knowledge, but into such knowledge as is most valuable to them in the practice of their industrial callings.

When the Legislature, in view of the fact that both females and males engage in the industries of the state, decreed that the benefits of the endowment should be offered to both sexes alike, it merely declared that the design of Congress in creating the Institution should be executed for both. Because, the relation which the legislature holds to the grant is simply that of a trustee, who, voluntarily accepting the trust, becomes legally bound to employ it for the purposes, and under the conditions, specified by Congress as the grantor. It has, therefore, no legal power, either by its own act, or that of any agent which it may appoint, to make such a use of the fund arising from the endowment as will either defeat, pervert, or fail to accomplish the expressed will of the grantor. The furnishing of what is usually termed "a literary" or "highly finished" education, designed to prepare "the accomplished woman" for her life of elegant leisure, would evidently be such a perversion, just to the extent that her life differs from that of the woman who works as an industrialist. However desirable it may be that Hortense should have a training especially qualifying her to amuse Charles Augustus with comedy, song, and the poetry of intellectual motion, Congress did not create Agricultural Colleges for that purpose. It had previously endowed the many State Universities for her particular benefit; which provide a course generous in Latin, Greek and polite literature, liberal in the purest of pure sciences, and garnished with the rarest blossoms of the hothouse arts. In granting a new and wholly different endowment, "in order" to make the industrial workers "fit for doing industrial business," it by no manner of means intended to duplicate the Universities. For, had such been the intention, the word "professional" would have been substituted for "industrial," and Congress, itself, would have "consolidated" this endowment with that of the Universities. The fact is, it had turned from Hortense, already so generously provided for, and was making a grant for the especial benefit of Mary,

Martha, Susan and Jane; and it enjoined the trustees to aim directly, fully and fairly, and to endeavor wisely, honestly and vigorously, to put these girls in actual possession of such knowledge and skill as would best enable them to earn the most money, in the easiest way, by intelligent labor

We admire Hortense; and, from a distance, most respectfully contemplate Charles Augustus. It is delightful, on commencement days, to mingle with the numerous and influential friends of their respective fathers, and listen to orations, great in power and glory, which describe the educational dainties feasted upon by the young couple, praise their remarkable appetites therefor, and predict the future greatness they must inevitably attain because daily 'fed on Cæsar's meat.' Hortense is so charming and happy, C. Augustus so strong and self-restrained, the influential friends so beaming, and the fathers so radiant, that all of us concur in the absolute necessity of instantly providing yet more generously for their education. And, as we roll away in easy carriages, the air seems more balmy with perfect content, the moonbeams brighter with promise, and the mellow earth more luxuriant in hope than ever before. But there are other scenes in cities. Why do Marys, with calloused fingers, pale faces, and wearied frames hurry past us from the workshop to the attic? Why do we hear of widows toiling from dawn to midnight, and from the day of their widowhood till death cuts the thread of toil, and the grave folds away the garments of labor? Why are there any orphans, forced by the gnawings of hunger to meekly endure the scorn of companions, the buffetings of adults and the avarice of Shylocks—little ones whom even God seems to have forgotten; whose pinched souls grow faint in the struggle for just enough bread to keep the cords of life from snapping? Why do crops fail, why do employers discharge workmen, and why does the resulting poverty so fetter the hands of industrious fathers that, though from the very core of great hearts intensely loving their daughters and sons, they are powerless to give them a professional education?

Nevertheless, neither the good God nor the American nation has really forgotten those classes which work with their hands; and, while endowing the Universities to educate Hortense, with others, the American Congress doubled the endowment for the industrial education of Mary, Martha and Jane. The two educations are, and must be, as different as is the labor of cooking a dinner different from the pleasure

of eating it, or as is the toil of the seamstress in making a shirt different from the comfort of him who wears it. From this standpoint, the attempt upon the part of Agricultural Colleges to educate Mary as the Universities educate Hortense is a perversion of the design of the grantor, which neither legislatures nor their agents have the legal or moral power to permit. And, in those states where the two institutions are separated, as much as all may desire to add the ripest of literary strawberries, the richest of intellectual cream, and the sweetest sugar of all the graces, to the educational repast spread for the fortunate Hortense, from our standpoint, the proposition to pay for these by taking the endowment of Agricultural Colleges, though grateful to tax paying pockets, looks so remarkably like square, strong-handed robbery, that the working classes, the friends of Mary and Tom, might not be able to see that it is not; might not perceive the distinction metaphysically apparent to the acute minds of the influential friends of Hortense and C. A.; might regard such a proposition as a political "gobble," and be disposed to furnish election tables with the gobblers roasted to a turn. There may be exactly such a danger, as is shown by the mutterings of the industrial journals all over the land; and, somehow, it does look as if the proposition were not exactly manly, honorable or just; and as if its execution would defeat the design of the grantor, who, in giving the money, certainly had a right to designate the object of its expenditure.

In determining the studies taught, the mode of teaching, and the facilities afforded by the female department of an Agricultural College, the controlling purpose must be that of making the girl an intelligent and competent industrialist. Any other attempt, or any unreasonable failure to accomplish this purpose, is a virtual breach of trust, quite as marked and great as would be that of sinking the education of farmers under the fathomless waves of a university course, directly designed for the training of lawyers, or preachers. And if it be objected that such a view limits these institutions to the single function of teaching the girl a trade only, we reply: that the female industrialist, being a woman both before and during her industrial work, has an inalienable right to a woman's education, as contemplated by the first group; that being, to say the least, as much a woman as the one who lives on the labor of others, she has as great a right to an education directly adapted to the performance of industrial work as has the latter to one which is not; that, since all such work requires

the use of both mind and body, her education must include both mental and physical training; that, in view of her womanhood, it must regard the strong probability of her marriage, and, therefore, of her need for such mental training as will best prepare her for the mental work of the wife and mother, who, just because she is also an industrialist, not only requires the mental culture of wives who are not, but, in addition, all the knowledge that is really useful in ensuring the greatest profit to her labor; that her education is to be "liberal" as well as "practical," and that the degree of liberalness allowable in her mental training, is just as great as that allowable in the training of any other woman.

The question now arises: What industries may properly be followed by women, and be fairly included in the list of those taught the girl? The answer will be governed by two considerations; first, the adaptedness of woman, as compared with man, to the labor required; and, second, the price paid for the given labor.

We assume that the characteristics of woman are two-fold, mental and physical, as heretofore indicated; and that, in the performance of industrial labor, the action of the body and that of the mind not only modify each other, but do so in varying degrees in different kinds of work. Admitting that a woman's touch is not more delicate than is man's, yet, if her perceptive faculty be stronger she must be better adapted to those operations in which the hand acts under the constant guidance of the eye. Drawing is a case in point, where, though her touch were finer, still, his is fine enough for all practical purposes. But, since the perfection of a picture lies in its accurate imitation of the original, if her observation of details be more exact, her work will be the better of the two; and her greater adaptedness thereto will depend upon her mental and not her physical characteristics. On the other hand, suppose her mental fitness for the work of the carpenter to be equal to man's, and that her bodily strength can be so increased by training as to enable her to work at the bench, still, it is clear that he, because of his greater natural strength, can exert the requisite force with less effort, and, therefore, work longer and cheaper than she. But it is also clear that his advantage, in this respect, would decrease exactly in the degree that the work required less force. In the handling of weighty timbers or the use of heavy tools, he would be superior; but in carving and wood engraving, she would be his physical equal, having strength sufficient for the use of the light

instruments employed; and, at this point, her assumed "intuitiveness" would give her the advantage, supposing her nerves to be as steady as his. So that, in determining the relative fitness of women and men for industrial labor, we must consider their relative power, both of body and mind, the relative inter-modifications of these, and the requirements of the proposed task.

For the present, let us put aside every other consideration; and, that we may the more easily do so, let us suppose that some one has just taken a contract for doing all the industrial work of the United States; that he is to employ a fresh nation of operatives who, being unskilled, are to receive instruction and training at his expense; and that his profit, as well as theirs, depends upon their natural adaptedness to the different kinds of labor—upon what principle would he determine the assignment of tasks among them? Noting the physical structure of each, he might first determine the labor for which woman was not so well suited as man, such as clearing forests, building houses, plowing, and all other operations requiring great and continued physical force. Next, those for which she was strong enough, such as writing, type setting, and those occupations which impose no greater strain than her system could healthily sustain. Finally, the things for which she was better adapted than he, such as making gossamer laces, or handling delicate glass goods, decidedly predisposed to shatter if a man so much as looks toward them. Very many of the leading vocations would thus be distributed, because of the physical characteristics of the two sexes, and because either sex possessed sufficient mental qualifications for their performance. He would then determine their mental differences; chiefly for the purpose of sorting out the numberless kinds of work contained in the middle group, which either sex might do with the same expenditure of physical force. For, not only does this class embrace those operations most difficult to assign to either man or woman exclusively, but those, also, which might be allotted to either or both as other considerations should indicate. Thus, if there were more labor to be performed, for which woman was the better suited, than there were women to do it, these marginal industries might be apportioned to man; and, on the other hand, were there more female workers than work for females, these could be given to woman, and man put upon tasks which he alone could do economically. If the contractor were convinced that man "took to reasoning" more naturally than woman, and, therefore, could be educated at less cost to do

better reasoning than she; and, on the other hand, that the same was true of her perceptive power; would he not try to classify these marginal operations with reference to their demand for the exercise of greater logical, or greater perceptive, strength? Simple counting is rather an act of perceiving than of reasoning; but accounting is distinctively a logical process, certain conclusions being deduced from given premises. Form, color and weight are matters of observation; though their arrangement may be a matter of computation. Changes may be wrought in the size, form, color or position of objects, either by hand, machinery, or chemical agents. And the making of these changes may chiefly depend upon perception, or chiefly upon calculation. While it would be difficult to enumerate all the kinds of labor which would fall on one side or the other of this line, yet, those which would do neither are, perhaps, fewer than might be expected. All simple numbering would, upon the assumed hypothesis, belong to woman. So would all "following of copy," of any sort whatever, and by the use of any instrument whatsoever, whether point, pencil, pen, brush, graver or the sculptor's trowel. The whole work of the clerical copyist, whether in posting entries, recording deeds, or extending short-hand notes would be hers; while the striking of a banker's trial balance would be more easily done by him. She ought to set type quicker than he from reprint; and not so rapidly from bad manuscript, where the compositor must carefully reason out from hieroglyphic hash the probable form of a living word. Upon the same principle, she would likely make a better free-hand drawing of any object fully presented to the eye; while he should excel in preparing working plans or perspectives by geometrical computation. So, too, in all invention which depends upon perception and effect, rather than upon causation and adaptation. The construction of a bridge, or the alignment of a roadbed, is simply a mathematical problem, as is the designing of machinery to accomplish a given purpose. But fitting a dress or shaping a mantle is more a matter of imitation than computation; trimming a bonnet is a question of form and colors, that is, effect; so is upholstering and decorating. No man can arrange the furniture of a room as tastefully as a woman of equal education; or give the final pull, push or puff to another woman's dress; while, in the matter of back hair and frizzing, the vacuous incapacity of man amounts to sheer sublimity! In reading character and exercising ready tact, the woman should excel; and, in a retail store, be a better clerk for the proprietor, and a

worse one for the buyer, than a man. In a wholesale store, where the point is, not the admiration of goods by the customer, but, whether he can buy cheaper elsewhere, a man should excel, on the above hypothesis. And so on, through all that class of operations requiring greater mental than physical skill; where they depend upon the taking of logical steps he should be the cheaper and more enduring workman; and she, where they depend upon perception and effect. We are not asserting that a woman does not reason, any more than that a man does not observe: perception involves reasoning; and reasoning, perception: but, are only trying to show that the several marginal industries can be classified with reference to their demand for a greater reasoning or a greater logical strength; and claim, that if our contractor were correct in his supposed belief, he would make money by assigning them to the male or the female worker upon the principle illustrated; that it would cost him less to educate his nation of inexperienced laborers, and them less in being educated; that both he as employer, and they as employes, would suffer fewer drawbacks in the shape of weariness, sickness and death, and make a greater profit, than upon any other division which now suggests itself. His belief might be erroneous; and, unquestionably, contradictory instances would arise, but only as exceptions that prove the rule, supposing the principle true. Nevertheless, viewing women as a mass and men as a whole, he certainly would not be so very far out of the way. At any rate, in seeking to determine what really are the natural powers, tastes and aptitudes of the sexes, and in apportioning to them that labor which most corresponds to their characteristics, as the air-waves to the ear correspond, he would act quite as wisely as does Mrs. Grundy. For he would be attempting just what the artist attempts—to imitate nature; and the greater his success therein, the greater would be their health, happiness and wealth, and, therefore, the greater his gain. He would act upon a principle, one not of his own devising, but of God's creation; and in the art of political economy, as in the art of health, the best results can only be obtained when each part, no matter how small, concealed or unnoted, is performing its function easily and naturally.

He would now consider another element in the problem, namely, that the majority of his female operatives would marry; and, as a consequence, that their attention to industrial labor would be more or less diverted by household demands. Hence, he would gain by assigning to them those vocations which least interfere with the dis-

charge of wifely duties. Those tasks which can be done at home would evidently be preferable; such as labor in the dairy and poultry yard, sewing, millinery and tailoring, copying, drawing, scroll and lathe work, carving, engraving, and decorative painting. Next in choice, would be those which, though usually performed in offices, are not limited by fixed hours; for example, type setting, recording legal documents and posting books. Finally, those which occupy the working day; as clerking, bookkeeping, telegraphing, upholstering, binding, and the numberless factory occupations. Men can endure continuous standing and walking better than women, while the latter suffer less from sedentary confinement than the former; and this fact, alone, might determine the distribution of some tasks.

Thus far, we have looked at the question with reference to the contractor's advantage; and have seen that, while the apportioning of work to the laborers upon the basis of their adaptedness, would be to his interest, it would also be to the laborer's advantage. But, as his profit would be greatly increased by low wages, and theirs be as much augmented by high wages, let us now view the question from their standpoint.

As a rule, labor in the form of manufactured articles commands a better price than in the form of personal service. When buying butter, the merchant does not pretend to offer less because a woman, and not a man, made it; though, in employing a clerk, he pays less salary to the woman than to the man. And it is notorious that school trustees, even when fully satisfied that a given female teacher will do as much work as a given man, and do it as skillfully, faithfully and efficiently, have no hesitation whatever in placing her salary anywhere from twenty to sixty per cent. lower than his. Whereupon, we all incline to take the part of the defenceless girl against the grizzly old bears. But, is it the bear's fault that female teachers can be obtained at less rates than males? And if, instead of buying the services of teachers, the bears were buying lumber for a school house, would they, as honest expenders of the public money, have a right to pay one hundred dollars per thousand to one dealer, when they could obtain as good an article from another at eighty dollars, or sixty dollars per thousand? Let us be just to the shaggy monsters. There is evidently a wrong somewhere, and one that should be righted; but doing another wrong will not increase the general stock of righteousness. And, besides, the superintendents of telegraph, railroad and manufacturing companies

do exactly the same thing, for precisely the same reason; and we cannot reach them through the ballot box, as we can the trustees. The job may be greater than our ability. This wrong exists in the fact that, as a result of our educational system and of public sentiment, there are fewer things which women can "respectably" do than men. Hence, they press into just such vocations as that of the teacher, and, by competition with each other, lower the price of such labor. Were the carpenter's wages cut down, by an oversupply of craftsmen, to three dollars a week, he could earn more as a farm hand or a breaker of stone; and would act accordingly, as would others, so relieving the pressure. But the avenues of paying labor for woman are very much fewer than for man. A steady throng empties into them from the homes, schools and colleges; year by year, they grow more crowded and dense; and the pressure, little by little, but always increasing, forces the weaker ones out into the side streets of toil, off into the alleys, down into the cellars, up into the attics of labor; and then, though they poise on the outer edge of temperance, honesty and chastity, to tremble in sheer horror at the yawning abyss; though they cry in agony to a God who seems not to hear, and to men who more than seem not to care; inch by inch, yet always onward, they are resistlessly impelled and finally toppled into hospitals, jails and brothels. Most unquestionably is there a terrible, red hot wrong, somewhere, somehow, and all the time! Yet, there is no use in fighting against the unchangeable laws of nature; and no possible way of escaping their penalties, save by obeying the law; in this case, the law of supply and demand of labor. The fact that an article commands a better price than does personal service, is just as true of those vocations requiring manual skill. The printer produces a column of matter ready for the press. It is wholly immaterial to the employer whether a woman or a man set the type;* and he pays therefor upon the basis of the market price, not that of sex. Telegraph companies, on the

* In this connection may be mentioned a statement, made to the writer by the intelligent foreman in the composing rooms of the University Press, Cambridge, Mass., that the work of the female compositors was fully equal to that of the men, and their presence in the office decidedly promotive of neatness and decorum. The mere fact of their employment, in such numbers, by such an establishment, which is not anywhere excelled in its typographical standard or workmanship, is a nut very good naturedly presented for cracking to an i-woman typos of the masculine persuasion. We give it up.—J. A. A.

other hand, take sex as their basis; and properly, too, since women will work for less than men.

Another fact for the girl's consideration, in shaping her education, is that the greater the taste and skill needed for the production of an article, the less will be the competition between workmen, and, therefore, the higher will be the price paid for labor; and, too, the stronger will be the market demand for the article, if it is one generally used. There are thousands of women, barely making a living by the most assiduous use of the needle, who, had they been properly taught, could earn twice as much in other ways. The time spent at our common schools in the study of grammar as a philosophy, geography as a mnemonic art, and a lot of sciences with no art about them, would more than suffice, while useful literary knowledge was also acquired, for thorough instruction in practical drawing, and for a paying drill in the use of the scroll saw, turning lathe, carver's and graver's tools. The first two can be driven with less effort than many sewing machines, which they much resemble; and the latter will be used with greater interest than the needle. It is as easy to place an idea on a block of wood, as upon a sheet of drawing paper; and not much more difficult to turn a vase, or engrave a leaf, than it is to represent them with the pencil. The product is worth far more in the market. As an illustration, take the manufacture of toys; for which there will be a demand as long as children have parents. In the saving of freight, alone, there is profit enough to make many a girl joyous, who now droops as an underpaid country school teacher. There is always a market for the articles prized by the housekeeper, both useful and ornamental; and the greater their beauty, the greater the demand for and profit on the labor. If our information be correct, nine out of every ten illustrations appearing in Harper's Bazar, and many of those in the Weekly, and Magazine, are drawn and engraved by women; and any woman who will furnish publishers such blocks as those of Nast, can command Nast's annual \$25,000. What possible right men have to monopolize the photographic business, is, from our standpoint, a dark and bloody mystery! Posturing, grouping, shading, timing, and chemical manipulations, are matters of perception, from first to last; which a woman ought to learn sooner, and do better, than a man, other things being equal. So, too, short-hand reporting. Quickness of ear and of pen, both exercises of perception, are its requisites. And as long as girls can be trained to read opera music, and strike chords

upon the piano, at the rate of five hundred harmonious notes per minute. we shall vigorously believe in their ability to stenograph two hundred words a minute, with less practice and equal ease.

Mention might be made of many other modes of earning a livelihood, quite as "respectable" as that of the governess, more healthful and agreeable, and far more profitable; and, also, of many other facts which girls should regard in the selection of an industry. But enough has been said to indicate the leading principles which, in our judgment, should underlie, and absolutely govern, the industrial education of women. We have purposely passed over many pursuits which are now commonly followed by females, because they are implied by the views presented, and because the positions advanced could be more exactly marked by illustrations taken from those industries which either man or woman can do.

If these principles be correct, it is evident that there will be far less clash between a "woman's" education, as contemplated by the first and second main groups, and a woman's "industrial" education, than might be supposed; and, certainly, far less than between her education under the prevailing system and that needed by the industrialist. In fact, there is just as much clash, and not a whit more, than there is between the growth of a rose bush producing April leaves, and its June growth of flowers. The one is a necessary preparation for the other, and the other an inevitable consequence of the one. They are but different effects of the same power, acting under the same law; and the best culture of the young bush will give the greatest profusion of those shapely embodiments of tinted glory which the world calls roses. It will be seen, too, that such an education has less in it that will be afterwards forgotten, and, therefore, that there never was any particular sense in getting; because, knowledge that is frequently used is always fresh in memory. Also, that such an education is a better agency in "mental discipline;" because, if nature be followed, the elements which constitute womanliness will be developed in their native proportions, and along their own distinctive lines; resulting in more perfect specimens of the genus woman. We submit, for the most earnest consideration of educators and parents, the question: Did the Creator, in making the being called woman, do the best thing? If he did, is it not better for us to follow his lines? If he did not, does the experience of the past, in a fair effort to make her a mental man, encourage the hope that we can materially improve upon either his

ideal or his workmanship? If it be the mission of colleges to do what the Almighty should have done but failed to do, we respectfully desire to quit. And, however much these, or any other criticisms of the prevailing system of female education, may be subjected to the charge of audacity, is not that system itself, with equal fairness, chargeable as a most audacious and arrogant criticism of the Creator? What practical household art does it teach? What womanly preparation does it give for the performance of the noblest function within the power of God to bestow upon humanity, that of seemingly creating life itself, and reproducing the generations? What practical drill in profitable work does it require? From first to last, its whole form and moving is against the idea that physical labor can be honorable in woman; or, that the necessity for marketable skill can ever crush down upon Hortense, with a force greater than that of the hydraulic press, compelling her to earn her bread, or—die! Perhaps, the God who built the family for his school room; who assigned the daily duties of the family as his lessons; who appointed the world's demand for industrial work as his vigilant teachers; and the wages it pays as his rewards; knew as much about the best methods of education as do any of us! And, perhaps, the mental drill of industrial workshops is, after all, quite as beneficial, wise and effective, as the man-made article put up and retailed in text books! And, whether it be or not, which is the more important, that the woman should be "cultured" into mental masculinity and physical incompetence, or, into womanly power, intelligence and ability? It is not a question whether women should marry the sturdy and resistless fact of work; she is already married thereto: the question is, whether it is better to make her bonds soft with love for labor, or attempt to obtain a divorce by that court which, years and years ago, made the decree, "In the sweat of thy face shalt thou eat bread." As a wife, many a woman would be happier in the use of industrial art, as a means of amusing her little ones and brightening her home; as a widow, she would most gratefully thank the giver of all mercies for her ability to keep or win a home. So that, whatever view be taken of such an education, it certainly cannot be worse, and it may be better, than the prevailing system.

Sooner or later, these principles, if true, will be adopted; and, where false, the truth will be found and substituted. It may be many long years before, as a people, we shall really substitute Mary for Hortense,

as the object of our educational system ; and more years, of struggle, experiment and achievement, before the appliances for training the former will equal those now provided for the latter. But it is only a matter of time, because a matter of right. One effort after another may fail, and one set of men after another fall ; but the Marys will remain. And there is too much cheery sympathy with the brave toilers for self-support—there is altogether too much of that spirit which grew into the world at the carpenter's bench of Palestine, making the impotent to walk and the lame to leap—ever to allow the continued perversion of the congressional endowment from its true design, or ever to rest content with anything less than the full accomplishment of a purpose so humane and godlike.

Such are the general principles by which the existing managers of this Institution will be fairly and squarely governed in their effort to provide a liberal and practical education for the industrial classes of Kansas. These principles have been so fully stated in order that all might see whether true premises have been taken and just conclusions drawn. No concealment has been attempted, no issue evaded, no point dodged. We clearly see the line we are following, and believe that it leads directly to a generous mountain looming up in grand proportions and sharp relief against the sky of the future—one which, when finally reached and fully developed, will prove an exhaustless mine of paying knowledge to future farmers, paying skill to future mechanics, self-support and God-birthered liberty to many a brave woman, who, else, must toil as thousands have toiled, and suffer as thousands have suffered all along the dreary past. We are yet a great ways off; with trails to find, roads to build, streams to bridge, long miles to march. It would be much pleasanter to take the eastward train of professional education, and, with genial companions, be smoothly rolled to the New York of professional life. But, being expressly ordered westward to the Rocky range of industrial skill, whither no such train runs, it is evident that a trip to professional New York would only take us that much farther from our journey's

end. It would, also, be easier, without examining the orders further than to know that we were to travel, and without especially thinking or caring where a train went, so that it was train, to fall in with the largest crowd, sit where it sat, and ride snoozingly onwards, convinced that we were right because the crowd was right, and growing characteristically indignant, between naps, at hints to the contrary!

At the close of the first year, we feel that in determining the point of destination much has been done; more, in really starting towards it; and still more in the progress made. Things which, at the outset, were denounced as chimerical, for example, the *teaching* of the trades, are now accomplished facts; and others, which were declared impossible, or, even worse, "unprofessional," have been sufficiently developed to establish both their possibility and cash value to the industrial student. Each of the new appliances has worked more successfully than was anticipated; and each position taken has been fully verified by resulting advantages. Many matters that, in the beginning, we all regarded as problematical and experimental are now solid blocks of our faith. The journey is very far from being ended; but, conscious of having done all that it was in our power to do, and more than satisfied with results, we are content with the past and buoyant for the future.

The difference between our line and that of other Agricultural Colleges seems to be this: They take as an objective point the graduation of agricultural experts, who shall act as missionaries to working farmers. We take as an objective point the graduation of a capable farmer, able to make his living by farming. Their theory is that of the Normal School, training teachers who shall instruct scholars; our theory is that of training the scholar. Along the mechanical branch, they seek to graduate master builders or superintendents of machine shops; we seek to graduate intelligent and skillful carpenters, masons or blacksmiths. They strike directly for those industries considered the highest, and believe that in reaching them they include all below; we strike for the industries most commonly followed in this state, and by successfully mastering them expect to climb up to the very rarest. Their mode may be best for them, and we are not in the least criticizing it; ours seems best for us. Kansas is neither New York, Massachusetts nor Ohio; and we shall not endeavor to reproduce their Agricultural Colleges. With us, where five agricultural scientists can make a living as such, five thousand capable farmers can far more

than make a living; and where five architects or master mechanics can obtain employment, five times as many mechanics can command wages. We aim to provide a KANSAS State Agricultural College, for the practical education of those who desire to follow industrial vocations.

In so doing, nothing of educational experience that is useful will be rejected because it is old; nor anything retained simply because it is practiced by literary colleges in educating for the professions. That which upon fair trial best serves our purpose will be employed; and that which does not will be discarded, though it were baldheaded with antiquity. Nothing will be attempted rashly; nothing clung to because once introduced; and nothing refused trial that promises effective aid in reaching and working the mine. And these statements apply not merely to the course of study, but to all methods and regulations. The management of such an endowment, for the accomplishment of such a purpose, is so weighty a responsibility that, neither because of public favor nor public criticism, can we afford to deviate from those measures which, in our judgment, will soonest and best execute the purpose of the grantor. So long as we act at all, we shall act as executors of the will; and, being justly held responsible for our deeds as such, we propose to do our own thinking and our own deciding. Whether the will be the best that could have been made, is none of our business; we are simply executors—though we believe that it is. Whether the youth of Kansas want an industrial education, is equally not our business; we are bound to furnish it to those applying, but not to make any one apply—just as a post master is bound to keep stamps for sale, but not to make people buy stamps. As the government pays its post masters, so the congressional endowment pays the salaries of those whom we employ; and the instruction given by them is furnished to all absolutely without charge or contingent.

We have thus stated our understanding of the object and provisions of the national will; the principles by which we shall be guided in executing it; and the reasons for the adoption of these principles. If the people, through their servants and our superiors, the law-making and law-enforcing officers of Kansas, desire that the national will shall be so executed, we ask their support, and material aid in the form of buildings and appliances, which, in accepting the grant, they contracted to furnish. If they do not so desire, but wish the enterprise

conducted upon other and antagonistic principles, our resignations are most heartily at their service—that those who have better ways may be able to try them, on their own responsibility; we will not take the risk. Whatever else may yet need to be tried, there is no use in repeating the experiment of flying a literary kite with an agricultural tail, so often made in various quarters. It is a pleasant regential and professorial amusement, and quite attractive to an immediate locality: but there is not a cent of money in it for the industrial student, whose estate pays for the kite. The fact that, out of some six hundred students attending Cornell University last year, only two were studying agriculture; and that, of all those at Harvard, but two were in its Agricultural school, is enough for us. What the brain, pluck, experience and unlimited cash of New York Cornell and Bostonian Harvard have not effected, we, at least, shall not attempt in Kansas. The best appliances that money can buy are there, and at a dozen other institutions, but the results are the same. And there is no particular sense in butting at a stone wall—as a regular business.

Some day and somewhere, there will be an Agricultural College looking so much like the grounds and buildings of a prosperous farmer who did his own repairing and manufacturing, that we of the present, happening by, would mistake it for a little hamlet of thriving artizans built in the heart of rich and well tilled fields. Nothing in its appearance would suggest our notion of the typical college. Its barns, sheds, yards and arrangement would embody the idea of the greatest utility at the least cost. Its implements, stock and fields would show them to be used for real profit. Its orchards and gardens would not only reveal the success of the owner, but, also, his full determination to enjoy the fruit with the labor. We would be quite certain that it was only such a farm—the best specimen of the highest type—were it not for the presence of cheap, stone buildings, one or two stories, scattered among the trees; all of them more resembling mechanic's shops than anything else; some, exactly; others, not exactly; and yet no two alike. One would be used for teaching practical agriculture, but would as little prompt our idea of a recitation room, as the whole cluster would that of an imposing college edifice. While there

would be seats for hearers and a place for a speaker, yet the latter would most suggest a circus ring for the exhibition of short-horns, when short-horns were discussed; of horses, pigs or sheep; of surgical operations; of plows, harrows or reapers. The walls would be lined with photographs of famous herds, working models of farm machinery, the grain and stalk of cereals. Part of its surrounding ground would be belted with every variety of growing grasses; and another would be for the draft-test of implements, or the trials of student skill. In fact, it would so look, and so be, like an actual workshop of real farming as not, even in the remotest way, to squint toward the article generally y'clept "scientific agriculture." The interior of another shop, a few rods distant, and equally inexpensive, with its grafting tables, potting benches, packing room, working greenhouse, and, outside, hot-beds and thrifty nursery grounds, would look so much like "gardening for profit" as to throw us completely off the trail of botany as a pure science. Another, would be a force shop, where light, heat, water, sound and electricity were made to reveal their laws, habits and effects, and to do their industrial work. The constant use of its appliances by busy students, in sacriligious defiance of the rule, "*don't touch the apparatus!*" italicised with professorial emphasis, would instantly satisfy us that there was nothing "collegiate" there, and that it was only a workshop where pupils had to become skillful workmen! There would be a mathematical shop, so much like a counting and drawing room, that, when it lead into an inventor's and pattern maker's room, no one could be surprised at its winding up in a machine shop. There would be an English shop, remarkably like a printing office; and the "Printer's Hand Book" of that day might strike us as an admirable drill in the art of using the English language, as well as in that of sticking type—almost as good as a grammar! There would be a woman's workshop, where the pale Hortense, at heart a good deal more sensible, earnest and womanly than society supposes, would strive for the bloom and 'faculty' of Mary. The blessed Mrs. Grundy would be dead! And there would be mason's, carpenter's and smith's shops. Not a shop of them all would cost \$5,000; and some, not the half of it; because they would be shops, warm, light, cheerful, but *workshops*—not requiring costly foundations and tall, heavy walls, not finished as are parlors, nor wasting space in broad corridors. And they would not have been foreordained by men of a previous generation, who, to save the lives of the best of them, could not possibly

have foretold just what buildings such a college would need. As, in the process of its growth, a want had been felt, its shop was supplied; and each generation had footed its own bills. No! it would not look like our great colleges; but very remarkably like a nest of real educational workshops, where flesh and blood students acquired marketable skill for industrial labor. In it, drill in the art would have greater prominence than the stringing of facts on the threads of a system; and the requirements of the art would serve as a skimmer to lift the cream of science as needed. Knowledge would be shoved paying end first, and not, everlastingly, philosophic end first. For the world would have gotten back to the history of its own experience, where art was the Columbus discovering science. In it, educational common sense would have supplanted uncommon educational nonsense. And leaving it, the newly fledged graduate, as does the newly fledged "jour.," would at once earn a living. Such an Agricultural College would be in keeping with its object, with the requirements and genius of labor, with itself! And, too, it would be in keeping with a rich, broad State, carpeted by emerald grasses, belted by golden grain, clumped with orchards, moving with herds, clustered with villages, threaded by railways, flecked with countless smoke-offerings from the altars of industry to the God of labor.

Some day; somewhere; somehow!



Course of Studies.

The following plan of studies presents three main courses of instruction. Each has been prepared with sole reference to the requirements of the given vocation; and upon the principles set forth. If we have succeeded in following these principles, the course for the farmer should differ from that for the mechanic or woman, in the degree that the daily work of the one differs from that of the other; and each should proportionately differ from the curriculum of a literary college. In order that the reader may determine these differences, an exhibit by lines is appended. As neither of these courses is designed for the education of lawyers, doctors or preachers, so neither is to be condemned just because it varies from the beaten path leading to

the learned professions. A passenger starting from Leavenworth to Denver would not feel particularly uneasy when informed that he had not taken the train to New York; nor would a person bound for Atchison be especially sad because he was not in the car for Fort Scott. Yet all of these trains leave the same depot; and, for a short distance, use the same rails. Each of these courses of instruction is to be viewed as a distinct and separate route, from a common point, to a region of its own; as neither following nor avoiding other routes, except for its own interests; and as taking the student directly and speedily to the designated vocation, or to the station nearest the industrial pursuit he desires.

The order of some of the studies will strike the professional educator as peculiar. This results from an effort to give the pupil each year, and year by year, such knowledge and skill as will be of the greatest market value to him, should he leave college. The governing principle may be thus illustrated: Suppose that by labor as a farm hand the student could, in the shape of boarding, clothing and money, earn \$150 a year. Instead of so doing he attends college, and takes three literary studies; each of these costs him \$50, not counting his industrial. If the ability acquired by him in the mastery of a given study is worth what it has cost, he has made a fair trade; otherwise, he has lost. Hence, guided by his interests, we have endeavored to estimate the relative value of studies, and to place them in the order of their market value. Taking the first year of the Farmer's Course, for example, the knowledge of tillage and stock given in "Practical Agriculture" is worth more to the student than that of geography; familiarity with plants more than with history; and skill in accounting and book-keeping more than skill in the technology of grammar as a science. The proof of the statement lies in the fact that should the student, at the end of that year, offer his services to a farmer, he would command good wages for his agricultural ability, and none whatever for his geographical knowledge. If it be said that the pupil may want to teach a district school, as a means of paying his way through college, we reply: First, that this is not a Normal School; and, second, that if he wants skill outside of his vocation, he can make better wages as a carpenter or operator than as a district teacher.

The special courses for book-keepers, operators, printers, druggists, and the several trades, are not tabulated; being included in those presented, and being shaped to individual cases.

FIRST YEAR.

FIRST TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Practical Agriculture.	1. Drawing.	1. Physiology.
2. Botany.	2. Drill in Arithmetic and Book-keeping.	2. Drill in English and Penmanship.
3. Drill in Arithmetic and Book-keeping.	3. Drill in English and Penmanship.	3. Drawing.
4. Industrial.	4. Industrial.	4. Industrial.

SECOND TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Practical Agriculture.	1. Drawing.	1. Drawing.
2. Botany.	2. Arithmetic and Book-keeping.	2. Drill in Arithmetic and Book-keeping.
3. Drill in English and Penmanship.	3. Drill in English and Penmanship.	3. U. S. History.
4. Industrial.	4. Industrial.	4. Industrial.

SECOND YEAR.

FIRST TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Practical Horticulture.	1. Algebra.	1. Botany.
2. Arithmetic and Book-keeping.	2. Drawing.	2. Arithmetic and Book-keeping.
3. English Structure.	3. English Structure.	3. English Structure.
4. Industrial.	4. Industrial.	4. Industrial.

SECOND TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Practical Horticulture.	1. Geometry and Drawing.	1. Botany.
2. Physics.	2. Physics.	2. Physics.
3. Economic Entomology.	3. Economic Botany or Geology.	3. Economic Entomology.
4. Industrial.	4. Industrial.	4. Industrial.

THIRD YEAR.

FIRST TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Comparative Physiology.	1. Trigonometry.	1. Farm Economy.
2. Inorganic Chemistry.	2. Inorganic Chemistry.	2. Practical Geometry.
3. Practical Geometry.	3. Rhetoric.	3. Inorganic Chemistry.
4. Industrial.	4. Industrial.	4. Industrial.

SECOND TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Practical Agriculture.	1. Mechanics.	1. Gardening.
2. Organic and Analytical Chemistry.	2. Analytical Chemistry and Metallurgy.	2. Organic and Analytical Chemistry.
3. Algebra.	3. Practical Law.	3. Practical Law or Drawing.
4. Industrial.	4. Industrial.	4. Industrial.

FOURTH YEAR.

FIRST TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Agricultural Chemistry.	1. Mechanics.	1. Household Economy.
2. Economic Zoology.	2. Drawing.	2. Household Chemistry and Special Hygiene.
3. Rhetoric.	3. Political Economy.	3. Rhetoric.
4. Industrial.	4. Industrial.	4. Industrial.

SECOND TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
1. Chemical Physics.	1. Engineering.	1. Chemical Physics.
2. Mechanics.	2. Chemical Physics.	2. Logic.
3. Political Economy.	3. Logic.	3. Drawing.
4. Industrial.	4. Industrial.	4. Industrial.

FIFTH YEAR.

FIRST TERM.

FARMER'S.	MECHANIC'S.	WOMAN'S.
<ol style="list-style-type: none"> 1. Meteorology. 2. Economic Geology. 3. Mental Philosophy. 4. Industrial. 	<p>Remaining Years to be studies special to designed vocation, together with the staple studies of the Farmer's Course.</p>	<ol style="list-style-type: none"> 1. Meteorology. 2. Mental Philosophy. 3. French, German or Economic Geology. 4. Industrial.

SECOND TERM.

FARMER'S.	WOMAN'S.
<ol style="list-style-type: none"> 1. Mineralogy. 2. Logic. 3. Practical Law. 4. Industrial. 	<ol style="list-style-type: none"> 1. Mineralogy. 2. Political Economy. 3. French or German. 4. Industrial.

SIXTH YEAR.

FIRST TERM.

FARMER'S.	WOMAN'S.
<ol style="list-style-type: none"> 1. U. S. Constitution. 2. Moral Philosophy. 3. History. 4. Industrial. 	<ol style="list-style-type: none"> 1. Physical Geography. 2. Moral Philosophy. 3. History. 4. Industrial.

SECOND TERM.

FARMER'S.	WOMAN'S.
<ol style="list-style-type: none"> 1. Modern History and Literature. 2. Butler's Analogy. 3. Industrial. 	<ol style="list-style-type: none"> 1. Modern History and Literature. 2. Butler's Analogy. 3. Industrial.

EXHIBIT BY LINES

OF THE

Number of Terms devoted to the Several Studies in each Course.

One term, having five recitations each week, is taken as the unit of measure. The figures at the end of the lines designate the number of terms. Thus, the first number, 3, means that three terms are given to Practical Agriculture; the following 2, that two are given to Horticulture. The difference between the length of the two lines represents to the eye the relative attention paid to these branches of Agriculture. Under the head of "Practice" are grouped the studies which impart skill to the workman in the designated vocation; under that of "Knowledge Used" those which furnish knowledge that is directly used by the workman in his vocation; and under that of "Aids" the studies which help him either in obtaining or using knowledge.

Farmer's Course—Six Years.**PRACTICE.**

Practical Agriculture.....3
 Practical Horticulture.....2
 Field and Shop Practice.....12

KNOWLEDGE USED.

Botany and Zoology.....5
 Physics and Chemistry.....5
 Geology, Mineralogy and Meteorology....3
 Practical Mathematics and Pol. Economy.....5

AIDS.

English and History.....7
 Legal, Mental and Moral.....6
 Algebra.....1

Mechanics' Course—First Four Years.**PRACTICE.**

Shops8
 Drawing4

KNOWLEDGE USED.

Practical Mathematics.....8
 Physics, Chemistry, &c.....5

AIDS.

English5
 Political Economy and Practical Law....2

Woman's Course—Six Years.

PRACTICE.

Domestic Economy.....	3
Industrial Drawing.....	4
Shop and House Practice.....	12

KNOWLEDGE USED.

Arithmetic and Book-keeping.....	2
Botany and Entomology.....	3
Physics, Chemistry and Hygiene.....	6
Practical English.....	5

AIDS.

Language and History.....	5
Legal, Mental, Moral.....	5
Physical Science.....	3

SUMMARY.

PRACTICE.

Farmer's.....	17
Mechanic's.....	12 First four years.
Woman's.....	19

KNOWLEDGE USED.

Farmer's.....	17
Mechanic's.....	13 First four years.
Woman's.....	16

AIDS.

Farmer's.....	14
Mechanic's.....	7 First four years.
Woman's.....	13

DEPARTMENTS OF INSTRUCTION.

Practical Agriculture.

By the term Practical Agriculture is understood that system of farm management which considers only ways and means, and the most productive methods. It does not pretend to give a scientific reason for all its processes, but is essentially practical, and the answer to all its questions is given in dollars and cents. Scientific or theoretical agriculture, on the other hand, concerns itself most with causes and effects, and the theory of farm operations. The answer to all its questions is not given in pecuniary values, but in formulas expressing relations to known laws. In short, practical agriculture is agriculture considered as an art based upon the experience and observation of men.

While it is true that the mass of empirical rules embodied in the term practical agriculture have had their origin in the wants of farmers, it is equally true that these rules, modified to suit the variations of soil and climate, are universal in their application. There is a tendency to ignore the fact that there are fixed principles in agriculture, and that these principles are not mere theories or scientific generalizations, but general truths having a substantial foundation in the practice of farmers.

The following course has been prepared with reference, first, to the full presentation of those principles everywhere recognized in the best practice of farmers; and, second, such modifications of their details as shall adapt them to the wants of the state of Kansas.

SIMPLE TILLAGE.

Under this head, are discussed the various implements used by the farmer in the pulverization of the soil, the preparation of the seed bed, and the extirpation of weeds.

The Plow:—The mechanical principles involved in the construction of the various kinds of plows; the action of the plow upon the soil

and subsoil; the different adjustments of the implement required in different soils and situations; the use of the swivel plow, trench plow and subsoil plow.

Draught :—Principles of draught; difference in the draft of different plows and adjustments, and the use of the dynamometer; influence of the different parts of the plow on draught; effect of speed upon draught.

The implements and operations of harrowing; cultivating; rolling.

Hoed Crops :—The value of hoed crops in a system of husbandry; the cultivation of corn and roots.

Farm Drainage :—Soils that need drainage; influence of draining in mitigating the effects of drought and floods; tile drains; mole drains; open drains; how to lay out a system of drains; house draining; draining farm cellars; sewerage.

STOCK BREEDING.

Position of stock raising in a system of husbandry; history and description of breeds; their economic value and adaptation to special localities; principles of breeding; in-and-in breeding; cross breeding.

The above course of instruction in practical agriculture and stock breeding is given in lectures. The lectures on stock breeding are delivered, in part, in the barn, the animals themselves being used as illustrations.

In addition, the care of our entire herd is given to the students of the class in practical agriculture, and they are expected to become *practically familiar* with the methods of stock men.

The elementary course, thus briefly shadowed forth, has been shaped with reference, first, to the wants of the student as an intelligent worker, and second, to his advancement in the general course.

The advanced course, on the other hand, is arranged for advanced students, and presupposes a knowledge of the elementary course, and considerable familiarity with the natural sciences, and especially mechanics, chemistry and botany.

FARM IMPLEMENTS.

Fourth Year :—Application of mechanical principles in the construction of farm machinery; calculating strength of parts; simplicity of machinery; nature of friction; estimation of amount of friction; the best way to apply strength; power of horses and of men; construction and use of farm implements

PRACTICAL AGRICULTURE.

General view of agriculture, ancient and modern; agricultural progress of the last century; relative advantages of mixed husbandry and special farming; the selection and arrangement of the farm, with reference to the system to be pursued; rotation of crops; general advantages of a rotation; the best rotation with reference to disposition of labor, production of manure and extermination of weeds; pasturage and the production of grain and forage crops; manures; how best housed and applied; composting manures; commercial fertilizers; systems of feeding; stall feeding; steaming food; soiling; experiments in feeding; farm buildings; farm houses; barns; pig yards; sheep barns.

Books of Reference.—Morton's Cyclopedia of Agriculture, Low's Practical Agriculture, Stephen's Book of the Farm, Allen's New American Farm Book, French's Farm Drainage, Waring's Draining for Profit, Low's Domesticated Animals, Randall's Practical Shepherd, Harris on the Pig, Allen's, Bell's and Carr's History of Short-horns, Mayhew's Illustrated Horse Management, Allen's American Cattle.

MEANS OF ILLUSTRATION.

A farm of two hundred acres, upland prairie, well provided with yards, lanes and interior fences, and abundantly equipped with implements and machinery. Among these are the Marsh harvesters, Buck-eye mower and reaper, with plows, harrows, drills and cultivators of the latest pattern.

A large two story stone barn, 46x96 feet, well provided with stalls for horses and cattle; a piggery, 14x54 feet, implement shed, 16x40 feet; together with poultry house, graineries and corn cribs.

Shorthorn, Devon, Jersey and Galloway cattle; Essex, Berkshire, Lancashire and Poland China swine. The college stock of cattle and swine, in quality, takes rank with the best in the country.

Practical Horticulture.

The instruction in this department is given wholly by lectures, accompanied by constant practical drill in all the work of the fruit,

flower and vegetable garden, nursery, orchard, vineyard and ornamental grounds.

The lectures embrace the following and kindred subjects, viz :

The Atmosphere :—Its moisture, temperature and circulation considered with reference to horticulture.

Horticultural Implements :—Their care and use.

Movable and permanent horticultural structures; cold frames; hot beds; green houses: embracing not only the modes of constructing but their after care, or mode of working.

Culture :—Weeds; means of eradicating, etc.

Seeds :—Their vitality; modes of collecting and preserving.

Propagation :—By seeds; by cuttings; layers; suckers; grafting; budding. Care of young plants: As sheltering, thinning, weeding, watering, manuring, training, pruning, keeping and working.

Improvement of Varieties :—By selection, and by hybridizing.

The Commercial Nursery :—All branches of the work considered in detail.

Pruning :—In nursery, fruit garden, orchard and forest.

The Orchard :—Selection of site; laying out of orchard; selection of trees; after culture.

Fruits for Orchard Culture :—Apple—history, varieties, classification; pear; quince; cherry; peach; nectarine; apricot; plum; almond; gooseberry; currant; raspberry; blackberry; strawberry; barberry; cranberry; chestnut; filbert; mulberry, and walnut.

Grape :—Varieties and modes of culture.

The Garden :—Both the vegetable and flower garden; their influence upon the home: their social and economic relation to the family considered; Woman's work in connection with the garden, in adding to the attractiveness and comfort of home.

The flower garden as a home institution; its claims; its location, extent and cost; general principles to govern in laying out; shrubs and flowers suited to our climate.

The Commercial Garden.—Floriculture as an occupation.

Forest Culture :—Importance and practicability of forest culture in Kansas; difficulties in the way, and the direction in which we may

secure success; immediate and ultimate returns; shelter belts, and their influence; modes of planting and cultivating different varieties.

We have already as ample means of illustration and practical instruction as the financial condition of the College will permit. We have about seventy acres of land devoted to this department. The collection of varieties of fruit is already large. We have large experimental apple, pear and peach orchards, vineyard and nursery, where all the ordinary business of the commercial nursery is regularly done. There are ample grounds devoted to artificial forests and lawns. Arrangements are already in progress to have upon the grounds suitable vegetable and flower gardens the coming season. The work in this department, as far as practicable, is done by the students.

Books of Reference:—Downing's Fruits and Fruit Trees; works of Loudon, Dr. J. A. Warder, J. J. Thomas and Lindley; Fruit Trees, by M. DuBreuil; Field's Pear Culture; Clement Hoare and others upon the grape; Gardening for Profit and Practical Floriculture, by Peter Henderson; Book of Flowers, by Joseph Breck; Book of Roses, by Parkman; Forest Trees, by Bryant; Forest Tree Culturist, by Fuller; Book of Evergreens, by Josiah Hoopes; My Garden, by Alfred Smee, F. R. S.; Downing's Landscape Gardening; Kemp on Landscape Gardening; Hand-book of Landscape Gardening, by J. Weidenman; Man and Nature, by Hon. G. P. Marsh.



Botany.

In the study of Vegetable Physiology, to which the first term is devoted, the various organs of the plants are traced through their successive stages of development, from the root of the germinating embryo to the stem, bud, leaf, flower, fruit and seed. By means of living plants, herbariums, charts and microscopes, the student is made familiar with the functions and name of every organ, and learns how the plant, by powers of its own, converts earth and air into living tissue, which, in turn, becomes the food of man and animals.

In the Farmer's course, the second term is devoted to the cereal grains, grasses, and other food plants, and the native and foreign weeds that are troublesome in their cultivation. Special attention is given

to the forest and fruit trees, and such hedge and textile plants as are suited to our climate.

In the Mechanic's course, the second term is given to the study of artistical botany, or the history of those plants which are employed or afford materials in the processes of the arts and manufactures. This also includes the texture, color, strength, durability, and other important qualities of wood, and the most important uses to which the different species are applied.

In the second term of the Woman's course, prominence is given to garden botany, which embraces not only the ordinary vegetables of the garden but also the herbs, shrubs and trees planted for ornament in the pleasure grounds, and the plants cultivated in the hot-house, parlor and conservatory.

Means of Illustration :—To this department belongs a Wardian case, filled with a choice collection of growing plants; a herbarium, including nearly all the grasses of Kansas; sections of native and foreign wood; and blocks of wood showing cell formation, etc., of our forest trees. A collection of plants is being made as rapidly as possible; and classes are drilled in the field at the proper season.

ENTOMOLOGY.

After the knowledge necessary to the proper grouping of the individuals of this numerous and diversified division of the animal kingdom is properly mastered, the orders, and those individuals of the orders, which come into the most direct and serious conflict with the farmer's interests, either by depredating upon growing crops or harvested grain and fruits, and those that infest domestic animals as well as their predaceous and parasitic enemies, are taken up in the order of their importance to the agriculturist. By the practical instruction in this department the student learns to recognize insect enemies in all their stages of development.

In the Woman's course, special attention is given to the insects that infest the house and garden, either in the larvæ or fully developed state.

The Bee :—The great interest universally manifested in this insect, since long before the process of making sugar was known to the present; the ease with which it is multiplied and improved by intelligent treatment, and its direct commercial value to man, invest its study with a special interest. This subject is thoroughly illustrated by colo-

nies of living bees and model hives, and is presented to the student under the following heads :

The different individuals of which a hive is composed ; the different kinds of bee hives ; the laying of the eggs ; the development of the young ; the swarms ; the collection of honey and wax ; the combs ; the honey harvest ; the uses of honey and wax.

Means of Illustration :—This department owns a large collection of mounted insects injurious to vegetation ; and those that are either directly or indirectly beneficial, are represented. Also breeding cases, in which insects are propagated, and improved vivaria, in which insects are kept for study by the classes. Class drill in the field.

GEOLOGY.

In accordance with the practical character of this Institution, the elaborate discussion of theories, the excessive use of technical terms, and dry accounts of fossils unimportant in the identification of strata, are avoided as far as possible. The student is made acquainted with the geography and characteristic plants and animals of each geological age ; and thus traces the progress in the formation of rocks, lands, mountains, rivers and seas, and the changes in the physical condition of the earth, as to heat, moisture, etc., and the progress in vegetable and animal life ; and learns the causes that uplifted, folded and fractured the strata, and how the fissures thus produced often become veins of metallic ores. This knowledge not only teaches the miner the mode of occurrence of minerals, but often enables him to decide, on a moment's inspection, whether a certain mineral may or may not be found in a given region, and thus save the time and means too frequently expended in searching for minerals where they cannot occur.

In the relation of geology to the arts, the agriculturist learns the composition of the soil he cultivates, the origin and distribution of the natural fertilizers, and how to detect beds of peat, marl, gypsum, phosphate of lime, etc. The miner not only learns the origin of faults, dikes, veins, and the mode of occurrence of the valuable minerals, but also many facts in mining essential to success in his occupation.

As in the selection of sites for large buildings, the choice of stone for walls, slates for roofs, and clay for brick, a knowledge of geology is as necessary to the mechanic as it is to the engineer in locating a canal, constructing a railroad, or building a dam, special attention is given to the practical lessons of this science.

Means of Illustration :—The appliances in this department consist of the largest and best selected cabinet of minerals and fossils in the West. It contains a full set of the minerals that enter into the composition of rocks, and the characteristic fossils of the geological periods as developed in America. Also geological maps showing the superposition of the strata, faults, dikes, etc. The students of this department also have access to the large conchological collections belonging to the professor of Geology.

Department of Chemistry and Physics.

The Chemical Department, in which is also included that of Physics, is furnished, considering the crowded condition of the college building, with comparatively commodious quarters, occupying one-half of the second floor. When taken in hand by the present professor in charge, upon September 1st, 1873, the whole chemical outfit of the Institution was contained in a small box about two feet square. There is now offered for the use of the student in this department a chemical laboratory complete in all its appointments, and, connected therewith, a lecture room. It has been pronounced, by many impartial observers, one of the most complete in the west.

The Means of Illustration of the department are ample for a thorough course of instruction in theoretical and applied chemistry.

The Laboratory is fully equipped with chemicals, chemical and philosophical cases, closets, large analytical tables, etc. Many of the rarer chemicals and pieces of apparatus are the only specimens of the kind in the West. The laboratory now offers accommodations for about twenty students in analysis.

The Lecture Room is conveniently connected with the laboratory. The room affords a seating capacity of about sixty, and is arranged in the most approved manner. The seats are placed upon a raised amphitheatre floor, thus enabling pupils from all parts of the room to witness, without inconvenience, the experiments of the lecturer.

Apparatus :—The department is amply supplied with choice apparatus, both chemical and physical—air pumps, electrical apparatus, Jelate machines, Holtz machines, Ruhmkorff's coils, Geissler's tubes,

fine balances, Prof. Jolly's specific gravity balances, Browning's spectroscope, projection lantern, &c., &c. A complete outfit of photographic apparatus has also been recently purchased. The object of this addition is two-fold: First, to afford facilities to special students desiring instruction in this branch. Second, as a means of illustration in all lecture experiments—now generally adopted in eastern universities—by which means a picture of any delicate specimen may, with a projection lantern, be much magnified upon a screen, and thus be made visible to a large class.

THE COURSE OF INSTRUCTION

in Chemistry and Physics, as furnished in this Institution is an eminently practical one. Without resting satisfied with imparting a mere theoretical knowledge of these sciences, a practical application of their principles is insisted upon at every step. The student must, with his own hands, and in the laboratory, perform the experiments which have been presented to him in the lecture room, thus fixing indelibly in his mind the principles which these experiments serve to illustrate. Especially useful and important is this course of instruction to the student who is desirous of fitting himself for the work of a farmer. By analysis with his own hands he is made practically familiar with the properties and composition of the soils he is to operate, and the probable sources of its sterility or fertility. By study and experiment, he becomes intimately acquainted with the chemical and physical forces which guide and control his work, and upon which depend, in a great measure, all plant life and activity.

Elementary Physics—popularly known as natural philosophy. This course embraces a full consideration of mechanical principles, mechanics of liquids, gasses and vapors; then following with the phenomena of light, heat, electricity, magnetism, etc.

Inorganic Chemistry embraces a full consideration of chemical forces, and of the laws governing chemical combinations. Then following with the elements in succession; their history, property, uses; and the general application of chemistry to the arts. The instruction in this course is imparted wholly by lectures, the student being required, in addition, to devote a certain number of hours each week to practice in the laboratory.

Organic Chemistry embraces the chemistry of organic compounds, and is likewise imparted by lectures and accompanied by laboratory

practice. This six months of preparatory study enables the student to enter advantageously upon the next step :

Chemical Analysis :—Here the student is provided with stands at the analytical tables furnished with apparatus and reagents, for which he is held personally responsible. In the course of his work he performs analyses of mineral waters, salts, alloys, ores, ash of plants, farm soils. During the past college year, the laboratory has been crowded to its utmost capacity, more desiring instruction than could be conveniently accommodated.

Thus prepared by the general study of the science, the student is qualified to next take the special departments, which naturally follow. To the student in the agricultural course,

Agricultural Chemistry, in which is embraced a full discussion of the application of chemical principles to farm economy ; composition of ash of plants ; the soil, composition and properties ; vegetable nutrition ; sources of the elements of plant food ; green manuring ; commercial manures, rotation of crops, etc.

To the student in the mechanical course,

Metallurgy—in both courses the instruction being imparted almost wholly by lectures.

Chemical Physics, pursued by students of the fifth year, embraces a full course in higher physics, including weights and measures, specific gravity, molecular forces, nature and laws of light, heat, statical and dynamical electricity, magnetism and spectrum analysis, with practical work with the spectroscope. The choice apparatus at the disposal of the department furnishes material for an elaborate course of experiment.

Meteorology is imparted by lectures and text book ; includes constitution and properties of the atmosphere ; laws of the variation of atmospheric pressure ; temperature and humidity ; laws of storms ; rain ; snow ; hail ; atmospheric electricity. A meteorological record was inaugurated at this station some fifteen years ago. The observations are now recorded from a very complete set of instruments, and are under the general supervision of the chief signal officer of the United States Army.

Mineralogy embraces a full consideration of the laws of crystallography, with the properties, forms and uses of the principal minerals within the limits of the United States. Much attention is given in

this course to Blowpipe practice and analysis, each student being required to identify, by blowpipe examination, a large representative series of minerals. A fine mineralogical cabinet furnishes abundant material for class work.

SPECIAL COURSES.

In addition to the regular course of instruction, as above delineated, there has been constantly in progress a special course in chemistry for select and post graduate students, occupying from three to five hours each day. The department will offer every facility to young men desiring to make chemical studies a specialty. Many students in higher analysis and in *pharmaceutical chemistry* have already availed themselves of this opportunity. To those completing a thorough course, a diploma will be given, stating the extent, character and perfection of their work.

Household Chemistry :—A special course of lectures is given to the ladies of the institution, upon chemical topics especially important in every day life. The course will embrace the chemistry of cooking; bread; tea and coffee; butter; cheese; ripening and preparation of fruits; dyeing and coloring; bleaching; disinfectants; ventilation, etc.

Telegraphy :—A special course of lectures will also be given to the students in telegraphy; comprising a consideration of the elementary principles of electricity; the line; the battery; the signals, etc.; principles of electro-magnetism; history of the electric telegraph; modern improvements in battery, line and signal. The desire is to produce *intelligent* operators, thoroughly familiar with every principle of the telegraph.

Special Work :—The work of the department has been by no means confined to student instruction in laboratory and lecture room. Its aid is constantly called into requisition from various quarters, in the examination of specimens requiring minute analysis; mineral waters; lead, silver, gold, tin, iron and zinc ores; farm soils, etc. By direction of the Board of Regents, analytical work for the State in the development of its resources is performed free of expense.

Books of Reference :—Miller; Muspratt; Watt's Chemical Dictionary; Ure; Wurtz' Dictionaire de Chimie; Wittstein; Fresenius; Johnson's Ag. Chemistry; Liebig's entire works; Johnson's "How Crops Grow," and "How Crops Feed;" Journal Royal Agricultural Society of England; Roscoe; Angus Smith; Fox; Loomis; Otto;

Storer; Plattner; Wagner; Chemical News; American Chemist; Annanles de Chimie et de Physique.

English Language and History.

Words are simply tools used to express ideas; and, since the vast majority of our communications are made by the employment of spoken or written words, skill in using them is as profitable to the industrialist as is dexterity with the needle profitable to the seamstress. The direct aim of the course is to make the student skillful and intelligent in handling the machinery called language, just as an engineer handles a locomotive; and no drill will be omitted, or effort spared, to gain this end. Apart from the course itself, which is far more practical and complete than that usually found in literary colleges, the constant attention given this subject by all the departments, and, especially, the practice required in the the printing and telegraph classes, affords superior advantages to the student.

DRILL IN ENGLISH.

"As grammar was made after language, so ought it to be taught after language."—HERBERT SPENCER.

Sounds of the language; drill in producing the vocal, subvocal and aspirate elements with accuracy, distinctness and volume; vowels, consonants.

Letters :—Form; power; rules for spelling, drill.

Words :—Signification, properties, modifications, variations, relation and dependence.

Sentences :—Drill in statement of ideas; description, clearness, terseness, vigor; business letters; discussion; capitalization; syllabication; punctuation; construction and analysis of sentences; elements, uses and names; criticism of compositions printed as written; proof reading; grammatical construction; superfluous words and clauses; drill in reading, speaking and penmanship.

Text Books :—Webster's Academic Dictionary; Lee and Hadley's Advanced Lessons in Language.

Pupils deficient in spelling, etc. should enter the printing class, the printing office being the workshop of language.

STRUCTURE OF ENGLISH

This includes the following subjects:

A SKETCH OF THE HISTORY OF ENGLISH. This is preparatory. It enables the student more fully to comprehend the genius of his mother tongue: to make acquaintance with "the soul of the language:" to master more readily and perfectly the principles and reasons underlying and explaining its structure. The review embraces a sketch of the several sources, Saxon, Norman, Latin, etc., whence our language has been derived; the circumstances under which they made their respective contributions, and the historical events which have had an influence in molding it to its present form and structure.

ENGLISH SOUNDS AND THEIR SIGNS. *Sounds*:—A more extended investigation of the *system of English pronunciation*, with the reasons for it.

Signs:—An examination of the letters of the alphabet, their powers in English and the influences which determine or modify those powers. The laws and principles governing their combination into syllables and words. As far as possible, the reasons underlying the rules of spelling and pronunciation are given. The subjects of punctuation and the proper use of capital letters are also kept before the student, and the rules referred to the history, which explains their existence.

ELEMENTS OF SENTENCES. The purpose in view in studying this subject is not to traverse the ground gone over in the study of grammar, but to fix in the mind of the student a clear understanding and remembrance of the names, the properties and offices of the several classes of words entering into an English sentence, by showing him the reasons for these things: to make more simple, as well as interesting and practically useful, a study otherwise "dry and unprofitable," in many cases, by explaining the rationale of the verbal forms and changes, the rules and maxims he is to remember and observe in his use of language. In the same manner he is conducted through a study of the mutual relations and dependencies of the several elements making up a sentence.

ELEMENTS OF WORDS. The end aimed at in this study is to learn everything about words which will aid in the effective use of them. Among the topics included are:

Roots:—What they are; their origin; their force and value as an

element of language; the manner of their growth into different parts of speech.

Stems :—Their derivation; their offices and properties; their relations to the other parts of words.

Prefixes :—The several sources whence derived; the relation of their force or significance to those sources; explanation of the laws and principles governing their use along with stems.

Suffixes :—The same topics here come up as in the study of prefixes.

Compounds :—Their value; their properties and uses; the laws governing their formation.

Synonyms :—Definitions; causes of their abundance in English; the principles to be observed in choosing among them, to express a thought.

REMARKS. *Criticism* :—This constitutes a prominent part of the exercises of the pupil through his whole course in the study of English. It not only diversifies and enlivens the class room exercises, but reduces to practice the principles of the structure of the language. By this means, the student acquires not only a knowledge of English, but readiness, skill and accuracy, in speaking or writing it. The exercises in criticism embrace not only examination of selected matter, but of original composition. Each pupil is required, from time to time, to submit original articles to the class for criticism. They are printed on the college press, and a copy given to each member for study. At the appointed time, every one is called upon to make such corrections or amendments as he thinks desirable.

Method :—The Structure of English is taught by lectures, a synopsis of each lecture being printed on the college press and furnished the class.

References :—Among the authorities referred to on the subject, are Trench, Marsh, Earle, Latham, Haldeman and Morris. Dictionaries: Bosworth, (Anglo-Saxon) Richardson, Wedgewood. In spelling and pronunciation, Webster is taken as the standard.

RHETORIC.

This embraces a rhetorical classification of sentences, a study of the peculiarities of the several kinds, and of their proper combination in discourse; figures of speech, with the rules to be observed in their use; style, its varieties, and the requisites to a good style; exer-

cises in writing and criticism; also, in delivery of selected and original orations, and in reading essays.

Text Book:—Hart's Composition and Rhetoric.

Books of Reference:—Quackenbos, Haven, Coppee, Whately, Campbell.

LOGIC.

This embraces a brief course in Deductive, and a fuller course in Inductive Logic. Among the topics belonging to the former are apprehension, judgment, reasoning; or, the term, the proposition, the syllogism; fallacies, arrangement, etc. Among the topics belonging to the latter are the subsidiary processes and the methods of inductive reasoning; relation of induction to deduction; fallacies incident to induction, etc. Along with the study of these topics, exercises are regularly held in writing; in forensic and extemporaneous discussion, with criticism of the same by the class. Also criticism of articles selected from the press.

Text Books:—Fowler's Deductive and Inductive Logic.

Books of Reference:—Schuyler, Coppee, Boyd, Whately, McCosh.

HISTORY.

This includes outlines both of Ancient and Modern History. Not only the leading events which lie on the surface of history are reviewed, but, as far as possible, the influences which in any country have fashioned the character and determined the history of its people are sought for. The geography, local and physical; the institutions, laws, manners, customs, occupations, arts, literature and religion of the several nations whose history is studied, are subjects of investigation.

In connection with the history of England and America, the HISTORY OF LITERATURE becomes a prominent topic. The end proposed is to give to the student broad and just views of human life and its duties; of the conditions to individual, social and national honor and prosperity. The volume of history is opened to him that he may "thence take for himself and his country that which he is to imitate, as well as learn the base which he is to avoid."

Text Books:—Wilson's Outlines of Ancient and Modern History, and Collier's History of English Literature.

Books of Reference:—Rollin, Grote, Thirlwall, Niebuhr, Arnold, Merivale, Gibbon, Hallam, Guizot, Hume, Lingard, Mackintosh, Ma-

caulay, Froude, Prescott, Motley, Craik, Taine, Shaw, Chambers, Allison, Felton, Allibone.

Mathematics.

Figures and lines, like words, are only instruments with which to convey ideas, or perform operations, that cannot be easily done without them. The arithmetical principles used in business are few and simple; but accuracy and rapidity in computation are only gained by practice. College graduates fail to retain clerkships, not because they do not know *why* given operations are performed, but because they can neither add, multiply nor divide with that habitual correctness which renders their work reliable.

DRILL IN ARITHMETIC.

The chief design of this study is to make the student expert in the use of numbers, as employed by the industrialist for profit. The occupation of a successful farmer demands the application of every principle of practical arithmetic, and is taken as a starting point, rather than that of an abstract system. Beginning with a simple cash account, book-keeping is gradually developed to the full extent of its real utility. The areas of fields, expense of crops, construction of houses, sales of produce and investment of capital, involve all the fundamental operations, and those of profit and loss, commission, taxes, insurance, exchange and stocks. Following this line, the student, so far from hammering away at "pure" science, draws from the mathematical storehouse what he needs, and sees why he needs it. Accuracy of calculation and posting, rather than a *mere* comprehension of the principles, is aimed at. Beside the recitation room drill in business forms, practice in the field is also given. Estimating the number of cords in a pile of wood said to be 100x4x4 feet is one thing; measuring a pile of wood, through which any number of cats may be harmlessly thrown, and in which four feet sticks are the exception, is quite another and more difficult thing.

ARITHMETIC AND BOOK-KEEPING

is a continuation of the above, having the same purpose and adopting such methods as the necessities of the class indicate. Thorough

instruction in the principles and forms of business law is given. It will be seen that this method of teaching book-keeping, besides ensuring arithmetical practice, develops practical skill in that important art.

PRACTICAL GEOMETRY.

Not one farmer in five hundred ever uses the transit in surveying his land, the testimony of the County Surveyor being decisive in court; but every farmer makes countless applications of lines and angles in laying off roads, planning houses, determining levels, etc. The object of this study is to make the pupil skillful in applying geometrical principles, by the aid of such simple instruments as are always at his command—in other words, to give him the same expertness therein that is profitable to the tinner or carpenter. The study, with suitable modifications, is also embraced in the Woman's course, and is valuable to every girl who cuts a dress or lays out a garden.

HIGHER MATHEMATICS.

"He who shall prepare a treatise simply and concisely unfolding the doctrines of Algebra, Geometry and Mechanics, adding examples calculated to strike the imagination, and showing their connection with other branches of knowledge and with the arts of common life, may fairly claim a large share in that rich harvest of discovery and invention which must be reaped by the thousands of ingenious and active men thus enabled to bend their faculties towards objects at once useful and sublime.—LORD BROUGHAM.

The text books thus called for by Lord Brougham twenty years ago are still needed. The nearest approach to them is found in the hand-books of the carpenter and machinist. The points to be attained by the student are set forth by the operations stated in these books, and the principles upon which the operations are based must be culled and taught from the ordinary authorities. As no man sharpens a chisel merely that it may be sharp, but that he may use it, so we aim to teach the mathematics useful to the industrialist, and not as a mere means of "mental discipline."

Algebra is studied with reference to its value in the subsequent course in mathematics. The student is made familiar with algebraic terms, symbols and formulas, so that he will be able to use intelligently the hand-books of his future trade or art. He is also taught the use of the equation in solving problems, and to demonstrate geometrical theorems. As few or none of the industrial pursuits usually fol-

lowed by women require this knowledge, algebra is omitted from the Woman's course. It can be taken by those so disposed.

Geometry :—In geometrical drawing the student becomes familiar with geometrical forms and their construction. Next follows a rigorous demonstration of the theorems, step by step, which lead to the principles embodied in the rules and tables of the trade hand-books. Then follows TRIGONOMETRY, plane and spherical; surveying, leveling and plotting; field practice being given until the student becomes expert with the transit, compass and level. MECHANICS, or the application of mathematics to physics; the laws of motion; mechanical powers; friction; fluids, etc. CIVIL ENGINEERING, building material, mortars, cements, masonry, arches, bridges, etc.

DRAWING.

Drawing, as used by the industrialist, is taught thoroughly, during the terms indicated in the several courses; the practical system of Walter Smith, Art Director of Massachusetts, being followed.

Legal, Mental and Moral Science.

In addition to the study of commercial law, as a part of book-keeping, arrangements are being made for a course of lectures, by an eminent jurist, upon PRACTICAL LAW, presenting those principles and requirements of both National and Kansas statutes which will be of most value to the farmer, mechanic and business woman.

THE CONSTITUTION OF THE UNITED STATES, POLITICAL ECONOMY, MENTAL PHILOSOPHY, MORAL PHILOSOPHY and BUTLER'S ANALOGY are taught as in other colleges, there being nothing in these subjects requiring special shaping for the industrialist.

Studies Special to Woman.

Besides those already indicated, attention is called to the following:

SPECIAL HYGIENE.

Thorough instruction is now given in physiology, from the text-book

of Dr. J. C. Dalton. It is designed, so soon as a competent and judicious woman can be secured as teacher, to give full and careful attention to the subject of special hygiene.

FARM ECONOMY.

This study considers those operations which usually come under the supervision of the farmer's wife or daughter, and which are not included in "gardening" and "household economy;" such as butter and cheese making, dairy management, care of poultry, curing meats, etc. A course of lectures will be commenced, by the Professor of Practical Agriculture, at the opening of the Fall term of 1875; and it is hoped that facilities for dairy practice will have been provided.

GARDENING.

These lectures are delivered by the Professor of Horticulture, beginning January, 1875, and are designed to prepare the girl for the supervision of either the vegetable, flower and ornamental garden, or for the occupation of a commercial florist. The department possesses ample facilities for illustrating the subject, and "gardens for profit." While the pupil will not be expected to perform manual labor that should be done by men, proper drill will be given.

HOUSEHOLD ECONOMY.

Lectures upon household chemistry, as previously mentioned, will be delivered by the Professor of Chemistry in the January term, 1875. Beginning with the fall term of that year, instruction will be given, by text-books and lectures, in the art of housekeeping; embracing cookery, domestic management, and kindred topics. Many elderly gentlemen sufficiently know, and more young gentlemen will duly discover, that systematic knowledge of how cooking ought to be done is luminously different from the ability to do it.* Instruction without practice can effect but little. And drill will be given in a kitchen-laboratory; the work will chiefly differ from that of a kitchen in the fact that, after a girl has learned to wash dishes or pare potatoes, she will

* There can hardly be a better illustration of the practical difference between "science" and "art," or one which flashes through humanity with greater vividity! If the happiness of men depended as much upon the efficiency of agencies for the "mental discipline" and "culture" of women as it does upon their housewifely ability, the owlism would have been punched out of a score of very respectable studies long ago.—J. A. A.

not be kept everlastingly at either. It is just as feasible to give practice in cooking, with pleasure and profit to the pupil, as it is to give laboratory practice in chemistry; and no more expensive. With or without facilities, we propose to try it during the next Fall term.

SEWING.

During the past year, instruction has been given in hand and machine sewing, cutting, fitting and making dresses; which will be continued, both because of its real value to those receiving it, and because of the success of what was an experiment, but is now a fixed fact. [*See Industrial Department.*]

Languages.

French: German:—To those desiring it, instruction is given to the fullest extent, as these languages are frequently of practical value to the industrialist.

Latin is only taught for the purpose of enabling the pupil to understand more readily the technical terms and names found in the sciences. The study is optional; but in no case will it be carried farther than the point indicated. The fact is that all the knowledge supposed to be acquired in this way, can be drawn more directly and easily from any standard dictionary of the English language. And, so far as the plea of "mental discipline" is concerned, any student completing the course of this Institution will have had a deal more of it than is given by a mastery of Cicero or Plato.

Industrial Departments.

The fourth study in each term is designated as an "Industrial." By this is meant that, in addition to the three literary recitations, every student must practice in some one of the following departments, under the direction of its superintendent, and at a designated hour. There is no difference whatever between these and the literary recitations, the grade of each affecting the pupil's standing. No student will be allowed to take less than two literary studies, and then only by special

permission of the President; and, while the pupil may, if able, take more than one industrial, one must be taken. The choice of industrials is left to the pupil or parent; otherwise assignment will be made by the President.

LABOR.

Manual labor by the students may be for either of two purposes. First, to acquire skill in a given art; second, to earn money. In the first case, the labor is educational; in the second, it should be paid for by the party benefited.

Educational Labor :—Manual labor in the recitations of the industrial departments, like mental labor in those of the literary departments, is purely educational and will not be remunerated. While the interest of the student is held paramount in the direction of this labor: the practice necessary to dexterity will be required. As no charge is made for material or tools, the College will utilize the work of the industrial classes when this can be done without impeding their progress.

Remunerated Labor :—When the Institution needs labor on the farm or elsewhere, which is not educational, but simply for its own profit, and which a student is able and willing to perform, it becomes an employer instead of a teacher, and he an employe instead of a scholar. It pays for work; he works for pay. The relation between them is commercial, not educational; and both parties must act upon business principles. Hence, the College will only furnish such employment as its own interests require, and will pay, according to the value of the service rendered, at from three to ten cents an hour.

FARM.

Paid labor on the farm is limited to the members of the class in Practical Agriculture. The evident justice of giving to those who intend to be farmers, rather than to those who do not, the opportunity of earning such wages as this department can afford to pay, renders further explanation of the regulation unnecessary. Members of the class, so electing, can also employ their industrial hour in farm work; and whenever, in the judgment of the Professor of Practical Agriculture, such work is needful for their acquisition of manual skill in farm operations, it will be given, taking precedence of any other industrial. When the practice is not required, owing to the dexterity of the pupil

or to the season, a recitation will be made in some other industrial. The facilities provided by this department enable it to give the best practice in all branches of farming, and, especially, in stock raising.

HORTICULTURAL GROUNDS.

The same regulation in regard to paid labor applies to work in the Horticultural Department; employment is limited to the members of the class in Practical Horticulture. And equally true is it that the best of practice can be given in any operation of the commercial nursery, orchard, garden and forestry of Kansas.

CARPENTER SHOP.

Each member of the class is furnished a bench, material for practice, and a case of the best tools, the key of which he retains. The Institution bears ordinary wear: extraordinary damage or loss of tools would be charged to the student—none having yet occurred. The pupil is taught the uses and names of tools, required to put and keep them in order, and carried through regular practice in sawing, planing, tenoning, mitering; house framing, building and finishing. After acquiring sufficient skill, he is permitted by the Superintendent to employ the industrial hour in making articles for his own use, paying for the material at cost price. Tables, office desks, book racks and entomological cases, are more commonly chosen, thus requiring the careful workmanship of the cabinet shop. Pupils learn more rapidly when at work on something they themselves want, and when receiving the profit on their own labor; and, as our sole purpose is to develop the skill of the student, every encouragement is given. It is confidently believed that after a boy has acquired market skill, and after experience has shown what articles yield the best profit in Kansas, second or third year students will, in this manner, be able to earn better wages than as teachers, and at the same time support themselves in college.

Inquiry shows that Manhattan alone imports more than \$70,000 worth of wagons and agricultural implements yearly, to say nothing of other articles; and, if the boys of Kansas can maintain themselves by manufacturing such, certainly no sensible person will object thereto. Outside of recitation hours, the student can work as much as he pleases.

The only drawback to this department is the contracted size of the building, which, while large enough for four benches, is more than

crowded by the eleven now in it. Besides the general set of tools, there are twenty-six student's kits. Each kit contains thirty-five pieces, as follows: Rule; try square; level; scribe awl; compasses; marking gauges; chalk line and reel; hatchet; drawing knife; rip, cross-cut and tenon saws; jack, jointer and smoothing planes; firmer chisels; framing chisels; screw driver; bitstock and bits; winding sticks; bench-hooks.

WAGON SHOP.


Instruction in the Wagon Shop embraces names, uses and care of tools; sawing and dressing spokes, fellies, axle-trees, tongues, hounds and boxes; turning hubs; building harrows, wheelbarrows, farm and spring wagons. The equipment is complete, and the wagon and blacksmith shops are under the same roof.

BLACKSMITH SHOP.

A full equipment of tools has been furnished, and the instruction and practice include management of bellows, striking with sledge, cutting threads on bolts and nuts, use of hand hammer in drawing down iron and sharpening plows, fitting and nailing horse shoes, ironing wagons, setting tires, making tools, etc.

PAINT SHOP.

Preparing work for painting, mixing colors, manner of applying, making putty, staining, graining and varnishing. A complete stock of tools and materials.

 Members of the classes in Practical Agriculture and Horticulture are advised to take some one of the mechanical industrials, in addition to the farm or nursery, for the purpose of acquiring that kind of skill in using tools which is daily demanded in the repair or construction work of the agriculturist, and which saves him so much annoyance and expense. The "handiness" thus gained is apt to be of more value in after life than dexterity in telegraphing or type setting. Of course a pupil who has chosen a mechanical trade, as that of the carpenter, should devote his attention to it exclusively. In time, Harness and Stone-cutter's shops will be added to the above.

TURNING SHOP.

A splendid foot and power lathe, with complete attachments for doing all kinds of wood and metal turning, has just been received from the machine shop of the Worcester Institute, and a class will begin practice in the January term of 1875. Instruction will embrace the care and use of tools; wood turning, plain and fancy; brass, ditto; iron, ditto. The lathe will also be used by the advanced classes in the wagon and carpenter shops. Reasonable proficiency in drawing is required as a condition of admission into this industrial.

Much of the additional apparatus needed by the chemical, telegraph and other departments will be made in this shop, at a saving of fifty per cent. on market rates. We are now building machines to be used by girls in scroll sawing, running as easily as the average sewing machine; also, light lathes for fancy wood or ivory turning, for cutting gains in bracket and box work, and for cutting vines, monograms, etc., on glass, with the emery wheel.

SCROLL SAWING, CARVING AND ENGRAVING SHOPS.

When a pupil has acquired the skill and taste inseparable from expertness in industrial drawing, it is as easy to produce forms in fabrics, wood, metal or glass, as it is upon paper, provided dexterity in the use of the appropriate instruments is also possessed. A girl who can guide the needle of a sewing machine around sharp curves, can with little practice use a scroll saw more exactly, because wood is stiffer than cotton. By multiplying instruments, the education of her perceptive faculties is increased. The draftsman uses a pencil; the dress maker the scissors; the turner a lathe; the carver, the engraver, and the stone cutter use chisels; the painter the brush. But it is evident that skill and taste in using lines constitute the common stock applied by all. Hence, as educational agents, and as means of profit or amusement, the kinds of practice given in this department are more than "fanciful;" each has a real market value. And it is clear that admission to these classes must be governed by the pupil's proficiency in drawing.

Scroll Sawing:—A suitable machine for healthful use by girls has just been received, and will be used by the advanced drawing classes. The experiment whether both girls and boys cannot more than make good wages will be fairly tested.

Carving :—A complete equipment.

Engraving :—Complete equipment for wood work. One young lady has been taking this industrial with such marked success as to strengthen the convictions expressed on pages 56–62.

STENOGRAPHY.

A class will be fully instructed and drilled in SHORT HAND REPORTING during the January term of 1875.

PHOTOGRAPHY.

A class of students sufficiently advanced in the chemical course will be started in the August term of 1875.

SEWING DEPARTMENT.

Besides the ordinary instruments and patterns, this department is constantly using the WHEELER & WILSON, WILCOX & GIBBS, SECOR, and AMERICAN COMPOUND BUTTON-HOLE machines, each of which has given perfect satisfaction. The instruction includes all the work of the dress maker and milliner. Material for ordinary practice is furnished by the Institution; and the expense has been less than was anticipated, owing to the fact that the members of the class are usually engaged on work for themselves. HARPER'S, DEMOREST'S and BUTERRICK'S journals are regularly supplied; and the latest styles are artistically reproduced, yet without extravagance.

It costs no more to make a calico dress neatly and tastefully than in the gunny sack order of feminine architecture;* and our experience thus far shows that a consciousness upon the part of the girl that she is dressed in the current mode is the surest prevention of extravagance. While, since the opening of this department, there has been no increase of the latter, there has been a marked improvement in the appearance of the young ladies generally, and of the members of this class particularly.

* If the Good Father did *not* intend our daughters to look well, he made a sad mistake in endowing them with such a taste for taste; and a sadder one in giving us so vigorous an appreciation thereof. Neither dowdyism nor preventable ugliness is a virtue; and both are as different from extravagance as is per-simmon sanctimony from genuine piety. Greater taste makes Mary the superior of Hortense, at one quarter the outlay.—J. A. A.

PRINTING DEPARTMENT.

The office contains twenty-six pairs of cases, a corresponding supply of type, composing sticks, a "proof" press, and all needed facilities for practice. The student is taught the boxes, indentation, capitalization, spacing, punctuation, etc. Several different drills are employed for the purpose of developing rapidity in composition; and the rules of book printing are enforced from the outset. A boy desirous to become a printer will find all appliances needed for acquiring expertness as a compositor, and, in addition, a course of thorough instruction in the English language, as used by the proof reader and editor; in book-keeping, adapted to subscription and job accounts; and in drawing, as the best developer of that true and facile taste which is the back bone of success in job printing. While he is an apprentice in an office, he cannot attend school; while attending school he cannot be an apprentice. Here, he can obtain precisely those advantages of manual and intellectual education which are most directly valuable to the compositor. As the classes advance, facilities are added to meet their necessities.

The teaching of type-setting, by itself, might be objectionable to many printers; but when, in connection therewith, is afforded the opportunity of obtaining a practical and full education directly shaped to meet the literary requirements of printers working for profit, it is believed that all compositors, mindful of their own experience and of the costly and toilsome methods by which they acquired literary knowledge, will greet this earnest effort to advance the interests of their craft with the same frank spirit in which it is made. The printer's money is laboriously earned, under the best circumstances; and any practical attempt to make his labor less, by giving him greater knowledge and skill for the daily task, will, when fully understood, commend itself.

Mention has heretofore been made of the invaluable aid given by type-setting in mastering the English language. As an educational drill in spelling, punctuation, etc., it has thus far proven itself superior to any other one known to us; and its union with the agencies employed in the literary class room makes a combination of greater efficiency than is elsewhere found. The cases are as valuable to the student of practical English as is the blackboard to the student of practical mathematics, or the anvil to the blacksmith.

TELEGRAPH DEPARTMENT.

The equipment of this department is probably superior to that found in any telegraphic school in the United States. A line, of American compound wire, four miles in length, and having sixteen offices, connects the depot of the Kansas Pacific Railway with the Horticultural and Farm grounds, the President's house, College, Telegraph room, Boarding house and Superintendent's office. The superiority of such a line to a wire strung around a room is apparent. In addition, are "jumpers," "locals" and a register, which latter is only used for the purpose of showing defective writing.

Practice is given in the alphabet and "reprint" sending, until the student can write and receive at the rate of six words per minute, when a line office is assigned. The rules and regulations of the Western Union Company are strictly enforced in all line practice; and during class hours all communications are in message form, and charged by tariff rates. The blanks, account books and reports are exact copies of those used by the Western Union; and the business of the office is conducted and settled precisely as are commercial lines, a week being counted as a month. The result is that a student completing the telegraphic course is thoroughly familiar with the whole detail of reports, errors and accounts. To the advanced classes, the Associated Press dispatches and market reports, found in the daily papers, are sent by the Superintendent during two hours every collegiate evening.

The literary course of instruction is directly adapted to the wants of operators, usually embracing drill in English, drill in arithmetic, book-keeping, penmanship, and, during the January term, a special course of lectures by the Professor of Chemistry, comprising a consideration of the elementary principles of electricity; the line; battery; signals, etc.; principles of electro-magnetism; history of the electric telegraph; modern improvements in battery, line and signals. The desire is to produce *intelligent* operators, thoroughly familiar with every principle of the telegraph.

A certificate is issued to pupils able, upon examination, to receive in writing at the rate of twenty-five words per minute, and to keep office accounts. The Institution does not hold itself responsible for the ability of persons unable to show such a diploma, but it does propose to make every word thereof true as respects those properly obtaining one; and thus, in due time, to secure the influence of railroad and

telegraph superintendents in favor of its graduates. The advertisements of "telegraph colleges" that "positions are guaranteed" are deceptive, simply because the proprietors of such establishments do not own the railroad and commercial lines of the United States. The superintendents of the latter, who alone appoint to paying offices, are very different gentlemen from the former.

Students in this department are furnished its "text books," in the shape of blanks, journals and ledgers, at cost price, say two dollars per term. Of course, no charge is made for instruction or use of instruments.

All messages are sent over the line free, and persons desiring to communicate with friends at the College are invited to do so.

INSTRUMENTAL MUSIC.

PIANO.

First Year :—First Term: New England Conservatory: Finger drill, study of letters and signs, time, accent, syncopation and expression. Blackboard drill: Transposition of scale by sharps and flats, writing major scales with relative minors. Second Term: New England Conservatory: Wrist movement, full and half staccato, rules for playing slurs, scale drill, portamento touch. Elementary harmony: Chromatic scale, scale intervals, triads of the major scale, triads of the minor scale.

Second Year :—First Term: New England Conservatory: Study of arpeggios, double thirds, scale exercises, embellishments, free sixth and octaves with studies by Schubert, Schuman, Auber, and others. Harmony analysis: First and second inversions of triads and harmonies of the seventh, first and third inversions. Second Term: New England Conservatory: Chromatic scales, scale drill, tremlo, trill, turn, studies by Beyer, Heller, Wolf, Lemoine, Burgmuller and Kulak. Practical Harmony: Dominant seventh and its resolutions, harmonizing to a given base.

Third Year :—First Term: New England Conservatory: Grand scale and arpeggios, broken chords, repeating octaves, triplets, with sonatas and studies by Schmidt, Duvernoy, Bertine, Mendelssohn, Hayden, Heller and Mozart. Theoretical and Practical Harmony: Harmonizing to a given base continued, chords of the seventh with other tone degrees. Chords of the ninth, eleventh and thirteenth.

Second Term: New England Conservatory: Grand arpeggio study, chromatic scale in major and minor thirds, drill study, arpeggios of the chord of the diminished seventh, scales of double thirds and sixth, passages with alternate hands, instrumentals and studies by Czerny, Heller, Spindle, Kohler, Loeschorn, and others. Advanced Harmony: Chromatic alterations of the fundamental harmonies, cadence.

Fourth Year:—First Term: Czerny Op. 299 and Heller Op. 45. Harmony and composition: Modulations, suspensions, the organ point. Second Term: Czerny Op. 740 and 337. Composition: Stationary voice, passing notes and chords, writing four part music.

Fifth Year:—First Term: Moschelles Op. 70. Cramer, first book. Second Term: Cramer, second book. Chapin Op. 10.

Sixth Year:—First Term: Chapin Op. 25. Moschelles Op. 95. Second Term; Studies by Thalberg, Liszt and others.

Instrumentals given throughout the whole course. Two lessons per week.

ORGAN.

First Year:—First Term: Elementary Exercises; Musical notation, finger drill, time, accent. Second Term: Home Recreations, part first: Elementary scale drill, studies in various keys.

Second Year:—First Term: Home Recreations, part second: Major and minor scales, octave studies, recreations. Second Term: Clark's Method, part first: Double thirds, triplets, grace notes chord practice, turn.

Third Year:—Clark's Method, part second: Grand scale practice, drill in sixth, close harmony and transcription. Second Term: Clark's Method, part third: Sonatas by Beethoven, voluntaries and playing from the score, selections from the opera.

Fourth Year:—First Term; Selected studies and church music. Second Term: Sight reading, studies and chorus practice.

Fifth Year:—First Term: Mozart Sonatas, part first. Second Term; Mozart Sonatas, part second.

Sixth Year:—Historical and practical work, with readings.


Harmony course same as Piano. Two lessons per week.

GUITAR.

Though small, it has its place to fill in the musical world. Text


books: N. P. B. Curtiss, Carcassia and Carulli, with songs and instrumentals.

Practice on the Piano or Organ is counted as an industrial in the Woman's Course only. Guitar practice is not.

 The only charge made by the Institution is in this department, where a fee of fifty cents per week, payable monthly, in advance, is required for the maintenance and purchase of instruments.

VOCAL MUSIC.

Vocal Music is taught both as a science and an art. Members of the elementary class are drilled on the tones of the scale, keeping accurate time, reading notes upon the staff, the transposition of the scale, singing easy music at sight, the articulation of words, etc. The advanced class is drilled in a higher cultivation of the voice, the reading and singing of more difficult music, the minor and chromatic scales, and a more perfect articulation and modulation of voice to express the true sentiment of the music. Unusual opportunities are afforded those who desire to improve themselves in this art; and many homes may be made happier through its influence.

 Vocal Music is not accepted as an industrial required by the schedule of studies. It is heartily commended to all students, and, apart from its intrinsic worth, as taught in this Institution it is a valuable drill in vocalization; but it is not presented as one of those industries by which a livelihood is to be earned.


All of the Industrial Departments above mentioned, except those of the Farm, Nursery and Music, have been opened since September 1873, or will be opened at the dates heretofore specified. Hence, in no one of them is there an industrial class more than a year and a half advanced. The instruction and facilities furnished to each are ahead of the necessities of the pupils, and will always be kept so. Every additional year will place the student upon a higher industrial plane; and the departments will be correspondingly developed and equipped. We do not claim that they are yet perfected; but only that they are fully equal to the work now required of them, and that they shall in due time be made perfect.

Directions to Applicants.

TERMS OF ADMISSION.

Candidates for admission must be fourteen years of age and pass a satisfactory examination in reading; arithmetic, through decimal fractions; English grammar, to syntax; and in descriptive geography. Classes are started at the beginning of each term in Drill in Arithmetic and Drill in English; and the pupil must have the knowledge above indicated, else he will be unable to retain position if admitted.

The object of the examination is to determine what classes he can enter with greatest profit to himself, and whether he is qualified to receive the information therein given. As the Institution is endowed for the express benefit of the industrial classes of Kansas, we shall not defeat its purpose by requiring a kind of knowledge upon the part of candidates which can only be gotten in the graded schools of towns or cities; but begin our course at the point to which the *average* common school of Kansas carries its pupils. Out of the fifty-five hundred such schools reported last year, probably less than three hundred are graded schools; and the advantages of these are not available to boys and girls residing in the country. Hence, a literary standard of admission, evidently proper for a University or Normal School, is as evidently improper in an Agricultural College. The real test of the efficiency of the work performed by such a college is not what the pupil knows when he enters, but what he learns while in it; and by this test we challenge comparison with any institution, literary or otherwise.

 Pupils will be received at any time during the year, if able to pass an additional examination upon the subjects studied by the classes which they expect to enter. But they will find it very greatly to their advantage to be present at the opening of each term, or as soon thereafter as possible.

GRADES.

Recitations are graded daily upon a scale of 100; and an examination of all classes is made at the close of each month, the grade of which is reckoned in the monthly average as equal to that of five recitations. By this method, the real progress of the student is more fairly measured; since it often happens that the daily standing of a

diffident pupil is raised by the examination grade, and that of a glib reciter, who learns easily and forgets as easily, is lowered. When possible, all examinations are made in writing.

A student not attaining an average grade of sixty for two months, is promptly dropped to a lower class, and, if there be none, is excluded from the Institution until able to do so. The work of grading is strict and uniform in all the departments, and this process is rigorously used for sifting out incompetent or indolent pupils; thus more than accomplishing all that is designed to be effected by a "high standard of admission." Hence, the student's continuance in the College wholly depends upon his own action.

The course is based upon the determination to make the labor required in the preparation of one industrial and of three literary recitations as much as the average student can healthfully perform, in ten hours a day. We design to give the pupil the worth of the time expended at College; and, in order thereto, he must do a full day's real work with brain or hand. Only those students who can maintain a standing of ninety in each study will be allowed to take more than the prescribed number of recitations; and no one will be permitted to have less than one industrial and two literary recitations, as already indicated on pages 95, 96.

RECITATIONS.

Recitations of fifty minutes begin at 8:40 A. M., Saturdays and Sundays excepted. The limited number of rooms in the College building renders it impossible to handle all the classes in the forenoon. Industrial recitations are interspersed with those in the literary departments, and the majority of students are through by 12 M. or 2 P. M.

RELIGIOUS.

Unless otherwise directed by parents, students are required to attend chapel at 8:30 A. M., on academic days, and divine service once every Sabbath, either in the College or elsewhere. Officers of State educational institutions virtually act as agents for two different parties, namely, the State and the parent. As agents of the State we are not empowered to require or enforce attendance upon any form of religious services, and should be exceedingly chary of exercising such power even were it possessed. The above regulation is not based upon any such foundation. It rests solely upon the expectation of the mothers

and fathers who commit their children to our care, that, being themselves absent, we will do, in their stead and as their agents, what we suppose they would do if present. There is not much danger of pupils receiving too much knowledge of God, or exercising too great a love of God, truth and man. Godliness is vastly different from sectarian proselytism. The latter we eschew, and will be nobody's agent therein. But it is our experience that the very great majority of Kansas parents desire their sons and daughters to attend religious services. Those who do not, will confer a favor by promptly notifying us thereof, and their wishes will be fully respected. It is easier for them to write to us than for us to write to the majority..

EXPENSES.

There are no charges whatever for attendance, either in the shape of tuition or contingent fees, with the single exception of fifty cents a week in the department of Instrumental Music. All instruction is absolutely free, as we have a right to suppose that Congress intended it to be when giving the endowment.

BOARDING.

Boarding can be had at from three to four dollars per week in private families. The College owns, but does not conduct, a boarding hall near by. It is well kept by Capt. A. Todd, who is now furnishing good boarding at \$2.50 per week, and to whom applications therefor should be addressed. The price in Manhattan and farm houses varies from three to four dollars. In a club of four students, renting a house, the average cost to each during the present term, has been \$1.11 per week.


AMOUNT EARNED.

All of the work needed on the farm, in the nursery and shops is given to students, as indicated on pages 96, 97. It is impossible to say how much any one can earn, since that depends upon what the student can do and what work there is to be done. Some are making one half their expenses, some the whole, and exceptional men have made more than expenses. As a rule, a faithful boy skilled in farm work can earn half his expenses by entering the Labor class of Practical Agriculture. During the year he can ordinarily acquire sufficient skill in the wood or iron shops to enable him to make articles

for sale. The whole question is one for his own consideration and decision; and he should not be too sanguine. We can teach all who come, but it is impossible for us to guarantee anything more.


RULES.

1. Behave as a true man or woman should, at all times and in all places.
2. Attend to your own business promptly, thoroughly and courteously; and vigorously let alone that of other people.
3. Penalty: "Leave!"

 New students will report to the President, after chapel exercises or at his office.

CALENDAR.

The current Collegiate Year began August 20th, 1874, the first term closing December 17th, 1874.

 The second term begins Thursday, January 7th, 1875, and closes Wednesday, May 26th, 1875.

STUDENTS' SOCIETIES.

WEBSTER SOCIETY:—Organized October 10th, 1868; chartered January, 1871; meets Saturday evening, at half past seven. J. E. Williamson, President: H. C. Rushmore, Secretary.

ALPHA BETA:—Organized October 17th, 1868; chartered December 20th, 1870; meets Friday afternoon, at one o'clock. G. H. Fail-
yer, President: C. A. Streeter, Secretary.

YOUNG MEN'S CHRISTIAN ASSOCIATION:—Organized February, 1872. Devotional exercises Sabbath evenings. L. E. Humphrey, President: A. A. Stewart, Secretary.

FINANCES.

ENDOWMENT.

The Congressional grant to this Institution was ninety thousand acres; but certain portions of the lands selected falling within railroad limits, and, being reckoned as two acres for one, only 81,601 acres have been received. Owing to a subsequent change in the line of the Kansas Pacific railroad from the Republican valley to that of the Smoky Hill, it is probable that the Government will restore sections thereby placed outside of the limit.

At the close of the fiscal year ending November 30th, 1874, 34,425 acres remained unsold, lying in the counties of Clay, Riley, Marshall, Washington and Dickinson. These are appraised and offered at an average price of \$6.35 per acre, representing a cash capital of \$218,598.75. A larger sum will probably be received from this source, as the rate of other lands in the state must advance. Sales are made on seven years time, the notes bearing ten per cent. interest, the land remaining untaxed until patented. At the date mentioned, the Land Agent held notes amounting to \$86,242.63.

The fund received from sale of land is invested by the Loan Commissioner in District School Bonds. The interest upon these notes and bonds constitutes the revenue derived by the Institution from the endowment. The principal of the Land account was as follows, November 30th, 1874:

Value of unsold lands.....	\$218,598.75
Land notes.....	86,242.63
Securities held by Treasurer.....	124,480.40
Balance uninvested at date.....	3,184.18
Total.....	<u>\$432,505.96</u>

LIABILITIES.

The only indebtedness is that arising from the maturity of certain

scrip, or "College Greenbacks," issued by the Regents of 1870, in denominations of \$100 each, and bearing seven per cent interest. An account of the transaction can be found in the First Annual Report of the Board of Commissioners on Public Institutions, 1873. The total issue was \$33,700, of which one-half is yet outstanding, and payable, as follows:

1875.....	\$6,175.24
1876.....	6,620.56
1877.....	4,187.40
Total.....	<u>\$16,983.20</u>

As the Institution cannot, even upon their present small scale, carry on its operations and meet these payments, and as the debt was not contracted by the present management, it is hoped that future Legislatures will follow the example of the last and provide for these warrants at maturity.

CURRENT YEAR.

The present Regents received from their predecessors an additional liability to that just mentioned, and, after reducing it as much as possible, obtained from the Legislature of 1873 an appropriation for canceling the balance, and for the necessary equipment of departments. The funds have been properly expended.

Notwithstanding the universal financial stringency of the past year, which has affected our income, all expenses have been promptly and fully met; and there remained in the hands of the Treasurer, November 30th, 1874, a balance of \$601.20. What has been done in a "grasshopper" year can certainly be done in ordinary years.

SELF-SUPPORTING.

These facts show that the Kansas State Agricultural College is not a "State" institution in the sense that tax payers must either foot its bills or see the doors closed. Preceding Boards might easily have withheld its lands, waiting for an average price of thirty, fifty or one hundred dollars per acre, and so have secured a royal income; in the meanwhile asking the pioneer generation of Kansas to defray its current expenses. But there is also a question whether pioneer generations, having everything to do with scant capital, may not, both justly and generously, permit posterity, inheriting capital and having com-

paratively little to do, to foot some of its own educational bills. Should this or any other institution, ten, twenty or thirty years hence, satisfactorily demonstrate a real worth, the men of those days can better afford to swell the endowment than can the property owners of these days afford to pay each professor and buy every cord of wood, while the untaxed lands are scattered through the counties as idle capital, and as hindrances to settlement. Those charged with the previous management of this endowment have wisely sold, as opportunity offered; and the proceeds are safely invested in paying securities. The income received by the Institution from this source amounts in ordinary years to about \$20,000, a sum which now meets, and should always meet, the expenses of instruction. Ultimately, the revenue will be \$40,000 or \$50,000 annually.

The industrial departments, as a whole, should pay their own expenses, both as a matter of ordinary business, and as educational agencies. Anybody can farm at a loss, and boys do not require instruction in that kind of farming. They should be taught to farm for profit, and the "means of illustration" should, by example as well as precept, show them how to do it. The same is true of all similar departments. From these sources the Institution derives some revenue. Even during the past year, the farm has cleared about one thousand dollars, over all expenses, excluding the legislative appropriations for permanent improvements. Ordinarily, the Nursery has exceeded this sum; and the Mechanical departments have made a profit, which will yearly increase. Were the Kansas State Agricultural College possessed of cheap industrial and educational workshops, it would be amply able to take care of itself, thanks to the generosity of the nation and state, and to the sagacity of its early financiers.

BUILDINGS.

Congress has prohibited any expenditure of the endowment for buildings, in the following section of the Organic Act:

No portion of said fund, *nor the interest thereon*, shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings.

If the Legislature will meet the greenbacks and appropriate twenty five thousand dollars for the immediate erection of five workshops, we can, at the present low rates of material and labor, provide all the room needed for the instruction of five hundred students. A building

costing \$150,000 would be as unsuited to our purposes as is a cathedral unsuitable for the purposes of a hotel. This Agricultural College is not a University; it does not want a University building; it will not voluntarily marry into the possession of one: but it does, most particularly and persistently, want *educational workshops!* The State would save much money and needless bother by erecting them at once. For when any Mary inherits an annual income of twenty thousand dollars, there is sure to be some Charles Augustus or other everlastingly figuring how to get it, and keeping the young woman in the parlor though her presence is needed in the kitchen or dairy.

PROPERTY.

Apart from the value of the educational services rendered to the more than twelve hundred different pupils taught since the opening of the Institution, the inventories rendered by the several departments, November 30th, 1874, aggregate as follows: In no case have extravagant prices been given, and the total is certainly under rather than over the mark.

Market Value of Property as per Reports, November, 30th, 1874.

Land Department.....	\$304,841.38
Treasurer	128,265.78
Farm Department:	
Land	\$14,700.00
Barn	11,000.00
Other Buildings.....	4,548 00
Live Stock and Implements	8,255.00
	<hr/>
	38,503.00
Horticultural Department:	
Land and Buildings.....	\$6,800.00
Stock, etc.....	6,485.00
	<hr/>
	13,285.00
Chemical Department.....	3,418.35
Department of Botany, Geology, etc.....	3,435.25
Library Department.....	4,947.30
Mathematical Department.....	294.17
Music Department.....	1,262.00
Sewing Department.....	304.70
Telegraph Department.....	693.88
Printing Department.....	447.53
Mechanical Department.....	2,132.43
College Building and Furniture.....	27,077.55
	<hr/>
Total	\$528,913.32

LIST OF STUDENTS

ENROLLED FROM

September 11, 1873, to December 17, 1874.

NAMES.	POST OFFICE.	RESIDENCE.
Baggerly, P. W.....	Grover	Ottawa.
Barnes, Wm. A.....	Albany	Nemaha.
Bates, Jennie M*.....	Marysville	Marshall.
Beamer, David A.....	Netawaka	Jackson.
Bell, Franklin P.....	Towanda	Butler.
Bill, Wilbur F.....	Manhattan.....	Riley.
Bird, Nathaniel S.....	Atchison	Atchison.
Bishop, Josie M.....	Kit Carson.....	Colorado.
Bowen, Frank E.....	Leavenworth	Leavenworth.
Broughton, George W.....	Olney	Illinois.
Brous, Alfred H.....	Manhattan.....	Pottawatomie.
Brous, Harry A.....	Manhattan.....	Pottawatomie.
Browning, Alice M.....	Manhattan.....	Riley.
Browning, Emma E.....	Manhattan.....	Riley.
Bubach, George M.....	Hiawatha	Brown.
Burnham, Wm. P.....	Topeka	Shawnee.
Burroughs, Frank C.....	Manhattan.....	Riley.
Burroughs, Julia A.....	Manhattan.....	Riley.
Caldwell, Stephenson A.....	College Springs.....	Iowa.

* Died, September 19th, 1873.

NAMES.	POST OFFICE.	RESIDENCE.
Caldwell, Stewart S.....	College Springs.....	Iowa.
Caldwell, Thomas J.....	Carlisle	Allen.
Campbell, Fannie.....	Manhattan.....	Riley.
Campbell, Florence A.....	Manhattan.....	Riley.
Cannon, Wm. Randall.....	Carlisle	Allen.
Carson, Renick.....	Perry	Jefferson.
Chamberlain, Willis P.....	Manhattan.....	Riley.
Chenoweth, Simeon	West Jefferson.....	Ohio.
Child, Ella S.....	Manhattan.....	Riley.
Clark, Edgar F.....	Manhattan.....	Riley.
Clark, Myron.....	Irving	Marshall.
Clark, Wm. B.....	Aberdeen.....	Indiana.
Cole, Fannie I.....	Manhattan.....	Riley.
Copley, John T.....	Perry	Jefferson.
Cormack, Joseph M.....	Junction City.....	Davis.
Crouse, Clay C.....	Oswego.....	Labette.
Davidson, George K.....	Fort Sill.....	Indian Ter.
Davidson, John A.....	Richmond	Franklin.
Davis, John E.....	Manhattan.....	Riley.
Dearborn, Carrie A.....	Manhattan.....	Riley.
Dearborn, Leila D.....	Manhattan.....	Riley.
Dennis, Ella N.....	Manhattan.....	Riley.
Denison, George A.....	Manhattan.....	Riley.
Detmers, Henry E.....	Manhattan.....	Riley.
Dow, Charles A.....	Hartford	Lyon.
Elliott, Clara.....	Manhattan.....	Riley.
Failyer, George H.....	Columbus	Cherokee.
Failyer, Mariam.....	Columbus	Cherokee.
Failyer, Miriam.....	Columbus	Cherokee.
Fields, Wm. H.....	Manhattan.....	Riley.
Flack, John B.....	Enterprise.....	Dickinson.
Fraunberg, Wm. S.....	Chetopa.....	Labette.
Gale, Ella M.....	Manhattan.....	Riley.
Gale, George A.....	Manhattan.....	Riley.
Gifford, Fred. M.....	Milford.....	Riley.
Gillaspie, Martha A.....	St. George.....	Pottawatomie.
Gilbert, Wm. D.....	Grasshopper Falls.....	Jefferson.
Godfrey, Albert N.....	Madison.....	Greenwood.
Graves, James M.....	Monrovia.....	Atchison.

NAMES.	POST OFFICE.	RESIDENCE.
Green, Mary E.....	Manhattan.....	Riley.
Gregg, Horace P.....	Manhattan.....	Riley.
Gregory, Wesley.....	Lyndon.....	Osage.
Griffing, John S.....	Manhattan.....	Riley.
Griffith, Beecher F.....	Belleville.....	Republic.
Grover, Mortimer C.....	Americus City.....	Nemaha.
Hancock, John A.....	Garnett.....	Anderson.
Harper, Josephine C.....	Manhattan.....	Riley.
Harris, Charles S.....	Ottawa.....	Franklin.
Hart, Sanford C.....	Grasshopper Falls.....	Jefferson.
Hiddleson, Frank W.....	Solomon Rapids.....	Mitchell.
Himes, Phoebe.....	Manhattan.....	Riley.
Hopkins, Viola.....	Milford.....	Davis.
Howard, Jasper M.....	Manhattan.....	Riley.
Howard, Walter C.....	Manhattan.....	Riley.
Horner, Wm. M.....	Holton.....	Jackson.
Houston, Charles S.....	Manhattan.....	Riley.
Houston, Lawrence N.....	Manhattan.....	Riley.
Houston, U. Grant.....	Manhattan.....	Riley.
Hoyt, Fred. O.....	Hiawatha.....	Brown.
Humphrey, Louis E.....	Milford.....	Davis.
Huston, Charles M.....	Junction City.....	Davis.
Ingraham, Florence M.....	Manhattan.....	Riley.
Irwin, Harry B.....	Leavenworth.....	Leavenworth.
Ish, Monroe S.....	Vermilion.....	Marshall.
Jaquith, Walter M.....	Milford.....	Davis.
Jarbeaux, Emma.....	Manhattan.....	Riley.
Jellison, Horace C.....	Cawker City.....	Mitchell.
Jenkins, Wm. H.....	Topeka.....	Shawnee.
Johnson, James S.....	Longton.....	Howard.
Johnson, Newton.....	Longton.....	Howard.
Johnston, Gough G.....	Parsons.....	Labette.
Johnston, May.....	Clay Center.....	Clay.
Johnston, Nellie.....	Clay Center.....	Clay.
Jones, Carrie L.....	Wabaunsee.....	Wabaunsee.
Kimball, Carrie N.....	Manhattan.....	Riley.
Kimble, Martha.....	Manhattan.....	Riley.
Kimble, Mary A.....	Manhattan.....	Riley.
Knipe, Lucy A.....	Manhattan.....	Riley.

NAMES.	POST OFFICE.	RESIDENCE.
Knipe, Wm. A.....	Manhattan.....	Riley.
Landon, Frank B.....	Vienna.....	Pottawatomie.
LaTourrett, James F.....	Ft. Lyon	Colorado.
Leasure, Marion F.....	LaCygne	Lynn.
Liebengood, John W.....	Hiawatha	Brown.
Leigh, Jesse D.....	White Rock	Republic.
Little, Charles C.....	New Eureka.....	Jackson.
Lofinck, Reuben E.....	Manhattan.....	Riley.
-Lowe, Harry B.....	White Rock	Republic.
Mails, Jennie E.....	Manhattan.....	Pottawatomie.
Maltby, Wm.....	Salina	Salina.
-Martin, Alice H.....	Denison.....	Texas.
-Martin, George T.....	Denison.....	Texas.
-Maynard, Henry S.....	Ossawatimie	Miami.
McBride, John H.....	Holton.....	Jackson.
McBride, Ralph W.....	Perry	Jefferson.
McCallum, Daniel E.....	Alida.....	Davis.
-McCormick, Henry H.....	Bramlette	Woodson.
-McCormick, James G.....	Bramlette	Woodson.
McCoy, Jacob H.....	Grasshopper Falls	Jefferson.
McLean, Henry A.....	Florence.....	Marion.
Meeker, Julian L.....	Ottawa.....	Franklin.
Meeker, Oliver.....	Wetmore.....	Nemaha.
Merrifield, Mary E.....	Manhattan.....	Riley.
Miller, Kilby D.....	Grantville	Jefferson.
Morgan, Lillie M.....	Washington	Washington.
Morgan, George C.....	Manhattan.....	Riley.
Moses, George C.....	Manhattan.....	Riley.
Mosher, Cephas F.....	Prairie City	Douglas.
Mudge, Eusebia B.....	Manhattan.....	Riley.
Murphy, Forrest W.....	Manhattan.....	Riley.
Nason, John E.....	Springside	Pottawatomie.
Nichols, Richard A.....	New Eureka.....	Jackson.
Noble, Alice E.....	Barret Station.....	Marshall.
Noble, Ina C.....	Barret Station.....	Marshall.
Noyes, Ida L.....	Wabaunsee	Wabaunsee.
Noyes, Mary A.....	Wabaunsee	Wabaunsee.
O'Leary, Alena.....	Abilene	Dickinson.
Oney, Joseph H.....	Garnett.....	Anderson.

NAMES.	POST OFFICE.	RESIDENCE.
Oursler, Alphonso R.....	Circleville.....	Jackson.
Owens, Lillie L.....	Leavenworth	Leavenworth.
Paige, Albert W.....	Manhattan.....	Riley.
Parish, Ella A.....	Manhattan.....	Riley.
Parish, Ida H.....	Manhattan.....	Riley.
Parish, Effie D.....	Manhattan.....	Riley.
Parkerson, Julia E.....	Manhattan.....	Riley.
Parsons, Mildred.....	Kansas City.....	Missouri.
Pechner, Lizzie M.....	Manhattan.....	Riley.
Pierce, Frank H.....	Manhattan.....	Riley.
Platt, Hattie M.....	Manhattan.....	Riley.
Pound, Byron H.....	Manhattan.....	Riley.
Pound, Isabella B	Manhattan.....	Riley.
Powell, Wm. H.....	Pavilion	Wabaunsee.
Proctor, John C.....	Twin Springs.....	Lynn.
Quimby, Frank B.....	Wakefield	Clay.
Redenbaugh, Lydia A.....	Lyndon	Osage.
Reed, Almeda J.....	Milford	Davis.
Reser, Isadora F.....	Barret Station.....	Marshall.
Reynolds, Wm. R.....	Longton	Howard.
Richmond, Corydon S.....	Delano	Sedgwick.
Richmond, Gustavus A	Delano	Sedgwick.
Richmond, Irving.....	Delano	Sedgwick.
Rogers, John H.....	Burlingame.....	Osage.
Rogers, Julia F.....	Burlingame.....	Osage.
Rogers, Louis B.....	Solomon City.....	Dickinson.
Root, Frank O.....	Wyandotte.....	Wyandotte.
Root, Hiram C.....	Topeka.....	Shawnee.
Rose, Charles A.....	Alma	Wabaunsee.
Rose, Edgar D.....	Alma	Wabaunsee.
Rushmore, Harry C.....	Grantville	Jefferson.
Russell, Coleman L.....	Wakefield.....	Clay.
Russell, Effie C.....	Wakefield.....	Clay.
Rust, Everett R.....	Eureka	Jackson.
Rust, Louisa M.....	Eureka	Jackson.
Sater, Harvey D.....	Worthington	Miami.
Sawyer, Nellie.....	Ottawa.....	Franklin.
Schillerstrom, Melchor W.....	Topeka.....	Shawnee.
Schæffer, Horace B.....	Grasshopper Falls.....	Jefferson.

NAMES.	POST OFFICE.	RESIDENCE.
Shannon, Albert M.....	Hiawatha	Brown.
Sherman, Marcus.....	Robinson.....	Brown.
Shinkle, Ezra M.....	Twin Springs.....	Lynn.
Shofe, Ella.....	Cottonwood Falls.....	Chase.
Shuemaker, Simon C.....	Wetmore.....	Nemaha.
Sikes, Melva E.....	Vienna.....	Pottawatomie.
Simpkins, Daniel R.....	St. George.....	Pottawatomie.
Smith, Edwin.....	Netawaka.....	Jackson.
Smith, Henry B.....	Lyndon.....	Osage.
Smith, James A.....	Netawaka.....	Jackson.
Sternberg, Wm. A.....	Ft. Harker.....	Ellsworth.
Stewart, Albert A.....	Oswego.....	Labette.
Stewart, Alice E.....	Manhattan.....	Riley.
Stewart, Wm. B.....	Netawaka.....	Jackson.
Stone, Wm. S.....	Towanda.....	Butler.
Streeter, Abbie J.....	Bala.....	Riley.
Streeter, Alfred C.....	Bala.....	Riley.
Streeter, Charles A.....	Bala.....	Riley.
Swearingen, Belle M.....	Marysville.....	Marshall.
Taylor, Wm. B.....	Wyandotte.....	Wyandotte.
Tempero, Louisa E.....	Merton.....	Wisconsin.
Thompson, Charles H.....	Alma.....	Wabaunsee.
Thorpe, Elsie L.....	Manhattan.....	Riley.
Thorpe, Ervin L.....	Manhattan.....	Riley.
Todd, Ida E.....	Topeka.....	Shawnee.
Todd, Irving.....	Manhattan.....	Riley.
Troth, James T.....	Alexandria.....	Virginia.
Ulrich, Edwin H.....	Manhattan.....	Riley.
Ulrich, Wm.....	Manhattan.....	Riley.
Vail, Mary A.*.....	Manhattan.....	Riley.
Wade, Mary.....	Neosho Falls.....	Woodson.
Wake, George A.....	Wakefield.....	Clay.
Walker, Claudius D.....	Winchester.....	Jefferson.
Walker, John C.....	Pleasant Run.....	Pottawatomie.
Wanemaker, Celia M.....	Barrett Station.....	Marshall.
Ward, Wilbur S.....	Redstone.....	Cloud.
Waring, Edwin F.....	Manhattan.....	Riley.

* Died, June 2d, 1874.

NAMES.	POST OFFICE.	RESIDENCE.
Webb, Manning S.....	Grasshopper Falls	Jefferson.
Webster, Lucy.....	Blue Rapids.....	Marshall
Weeks, Abbie C.....	Irving	Marshall.
Wertzberg, Mary A.....	Alma	Wabaunsee.
Wheeler, Charles G.....	Nortonville	Jefferson.
White, A. Judson.....	Manhattan.....	Riley.
White, J. DeWitt.....	Atlanta	Rice.
Whitman, Minerva E.....	Lyndon.....	Osage.
Whitney, Genevieve	Manhattan.....	Riley.
Wiley, Lura L.....	Marysville	Marshall.
Wilkin, Frank H.....	Wichita.....	Sedgwick.
Williamson, Joseph E.....	Royal Center.....	Indiana.
Willes, Edmund J.....	Skiddy.....	Morris.
Wilson, Wm. G.....	Junction City.....	Davis.
Winnie, Ella M.....	Manhattan.....	Riley.
Winter, Wallace.....	Richmond.....	Franklin.
Woodward, Ida.....	Manhattan.....	Riley.
Young, Willoughby.....	Junction City.....	Davis.

Special Students in Chemistry.

Brous, Harry A.—Analytical.
 Kekoe, Frank B.—Pharmaceutical.
 Kehoe, Peter P.—Pharmaceutical.
 Whitehorn, S.—Assaying.
 Williston, S. W.—Analytical.

Table showing Classes, average Age and number of regular Students by Terms.

CLASSES.	NO. STUDENTS.			AVERAGE AGE OF STUDENTS.		
	MALE	FE- MALE	TOT'L	MALE	FE- MALE	TOT'L
FALL TERM: September 11 to December 20, 1873:						
First Preparatory.....	38	25	63	18.8	16.7	8
Second Preparatory.....	36	14	50	19.5	17.8	19
Freshman.....	18	5	23	18.3	19	18.5
Sophomore.....	10	4	14	21.2	19.05	20.7
Junior.....	1	2	3	21	23	22.3
Senior.....	5	1	6	21.8	20	21.5
Total.....	108	51	159	19.8	17.7	18.8
WINTER TERM: January 2 to March 25, 1874:						
First Year.....	36	24	60	18.6	16.7	17.8
Second Year.....	26	15	41	19.2	18	18.8
Third Year.....	14	5	19	19.3	18.6	19.1
Fourth Year.....	8	4	12	21.1	19.5	20.6
Fifth Year.....	1	2	3	22	23	22.6
Sixth Year.....	5	1	6	21.8	21	21.6
Total.....	90	51	141	19.3	17.8	18.8
SPRING TERM: April 2 to June 24, 1874:						
First Year.....	25	13	38	19	16	18
Second Year.....	14	6	20	18.6	16.5	18
Third Year.....	6	3	9	19	18.6	18.8
Fourth Year.....	4	1	5	20.2	17	19.6
Fifth Year.....	1	1	2	22	19	20.5
Sixth Year.....	5		5	21.8		21.8
Total.....	55	24	79	19.4	16.6	18.6
FALL TERM: August 20 to December 17, 1874:						
First Year.....	24	15	39	18.5	16.3	17.6
Second Year.....	28	11	39	19	17.1	18.4
Third Year.....	19	8	27	19.6	17.5	19
Fourth Year.....	3	2	5	19.6	17	18.6
Fifth Year.....	3	2	5	21.3	19	20.4
Sixth Year.....	1	1	2	22	20	21
Total.....	78	39	117	19.1	17.1	18.4
COLLEGIATE YEAR 1873-1874.....	124	59	183	19.5	17.3	18.7
CALENDAR YEAR 1874.....	139	69	208	19.2	17.7	18.7

LIST OF GRADUATES.

1867.

NAMES.	OCCUPATION.	RESIDENCE.
Denison, Henry L.....	Reporter.....	Boulder City, Col.
Haines, Belle M.....		Topeka, Kans.
Haines, Emma L.....	Teacher.....	Wamego, Kans.
Points, John J.....	Law Student.....	Omaha, Neb.
White, Martha A.....		Chicago, Ill.

1871.

Campbell, Emily M.....		Concordia, Kans.
Denison, Ellen F.....		Baldwin City, Kans.
Houston, Luella M.....		Manhattan, Kans.
Wheeldon, Chas. O.....	Lawyer.....	Lincoln, Neb.
White, Kate E.....		Manhattan, Kans.

1872.

Haines, Theophania M.....	Teacher.....	Ellis, Kans.
Todd, Albert.....	Cadet U. S. M. Acad.,	West Point, N.Y.
Williston, S. Wendell.....	Medical Student.....	Manhattan, Kans.

1873.

Davis, Eliza Z.....		Manhattan, Kans.
Kimble, Samuel.....	Law Student.....	Manhattan, Kans.

1874.

Brous, Harry A.....	Medical Student.....	Manhattan, Kans.
Clark, Edgar F.....	Law Student.....	Manhattan, Kans.
Davis, John E.....	Student Dentistry.....	Manhattan, Kans.
Gilbert, Wm. D.....	Law Student, Grasshopper Falls,	Kans.
White, A. Judson.....	Theological Student,	Manhattan, Kans.

Whole number of Graduates, 20.

Intended occupation of men: Lawyer, 5; Physician, 2; Dentist, 1; Minister, 1; Reporter, 1; U. S. Army, 1: total, 11.

It will yet be two or three years before classes can graduate upon the present course of instruction.

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