

**Chemical commerce and its commodities : a valedictory address / by Prof. R. Welch, A.M., at commencement of Hahnemann Medical College, 1866.**

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**Publication/Creation**

Chicago : C. S. Halsey, 147 Clark Street, [1866]

**Persistent URL**

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WELCH, (R)

CHEMICAL COMMERCE  
AND  
ITS COMMODITIES.

A  
VALEDICTORY ADDRESS

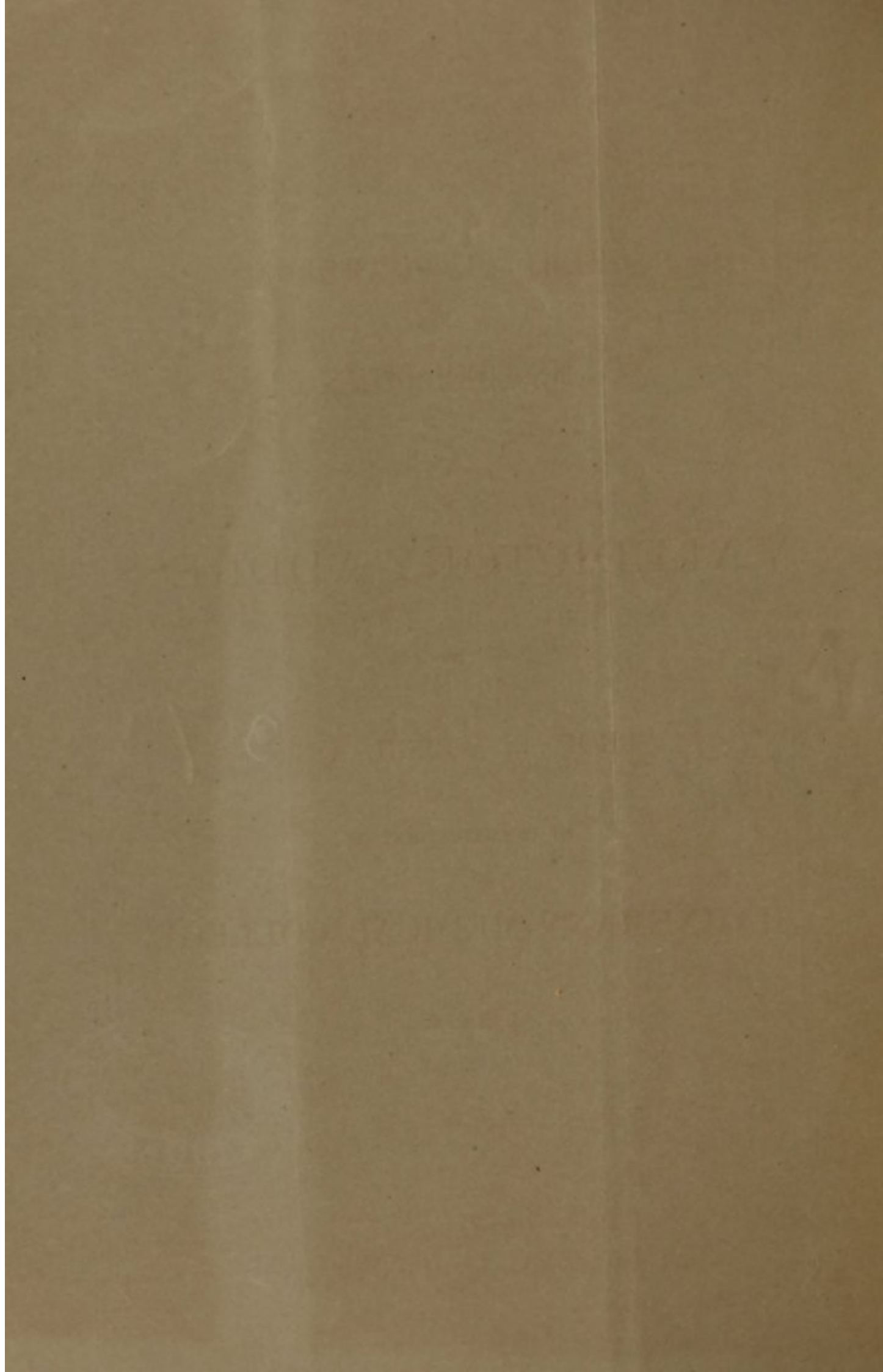
BY  
PROF. R. WELCH, A.M.

At Commencement of

HAHNEMANN MEDICAL COLLEGE.

1866.

CHICAGO, ILL.:  
C. S. HALSEY, ::::: 147 CLARK STREET



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# CHEMICAL COMMERCE

AND

## ITS COMMODITIES.

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GENTLEMEN OF THE GRADUATING CLASS:—

In the lectures which it has been my privilege to deliver to you, during your connection with this institution, I have described the elements which constitute the air, the water, and the earth, for the most part, each distinct from the other. I have sought, the better to illustrate their varied natures and properties, to isolate each, for the time, from the great mass to which it belonged and of which it formed a part; even as the anatomist has held to your view a single detached bone, nerve or muscle of a once living man, so have I presented to you little fragments of the great, living, moving earth.

To-night, probably the last time I shall ever address you all, I could conceive of no more fitting subject than the reciprocal relations which these elements bear to each other in the universe which they unite to form. From the chemistry of the lecture-room, then, let us turn to that grander aspect of the science as presented in the works of God.

The change is no trivial one; for in no thing, perhaps, are we so forcibly struck with the greatness of the Deity and the insignificance of man, as when we turn from the productions of the chemist in the laboratory, to the grander results effected by the Author of the universe. As are the pyramids beside the Alps, the floating gardens of Mexico compared with the prairies of Illinois, so are the manifestations of electricity as developed by Franklin, compared with the sublime phenomena produced by Him who "prepared the way for the lightnings of the thunder." The materials are the same in either case; but with the chemist



they are cold, inert, motionless. They differ as much from the particles of the living world around us as the lifeless mutilated corpse in the dissecting room differs from the vigorous, animated man who sways a multitude or directs an army. In nature, however, these atoms are endowed with life, affections, and the power of motion. They move along the paths marked out for them with as much certainty as that with which the planets revolve in their courses.

Next to the sublimity of the doctrine which Christianity teaches in regard to the immortality of the soul, stands the grandeur of the principle which modern chemistry has demonstrated in relation to the eternity of matter. At no two periods since time began, has the aspect of the earth been the same, and still the identity of its composition as a mass has ever been preserved. How many and what varied forms of matter has the Great Artisan fashioned from the same materials! From how few simples have so many compounds—animate and inanimate, bane and antidote—been produced. With what masterly workmanship has the commonest clay been moulded into forms of resplendent beauty; and then as often as the "pitcher" has been "broken at the fountain," how have the shapelss fragments been remoulded into other and still more beautiful forms!

Although the circulation of matter is regulated by fixed and immutable laws, still the time that is required to complete a revolution is as variable as is the nature of organic structures. The worm feeds upon the leaf of the growing tree, and at the same time gives back the materials to construct the very fiber he is devouring. A fish and plant will live for months in an aquarium, almost entirely, on the gases that are passing from one to the other through the medium of the water. Remove the plant, and the lively, restless fish dies in a day—dies from the effects of the very substance that gave life to the plant. Remove the fish, and the plant lives for a brief interval upon portions of its decaying members, and then life ceases with the plant as with the fish. An orange-grower sits beneath the branches of the tree he has planted, eating the luscious, ever-ripening fruit, and in an hour the tree may receive back again the materials for forming other fruits to be in their turn devoured.



Not always, however, are these changes produced so simply or so speedily. The oxygen that united with the iron in the forge of Tubal Cain, may have remained disengaged through all the changing centuries till now. But to-morrow it may unite with the carbon of coal that existed generations before the flood; and the carbonic acid so formed combining with lime in the ocean may help form building material for cities, whose sites are now covered a thousand fathoms deep beneath the waters of the Pacific. Indeed, this would be doing no more for the distant future than the distant past has done for us. The lime of the mortar used in the construction of the beautiful building we now occupy, was manufactured from a quarry within the limits of this city. This quarry of limestone is mainly the deposit of the coral insect that once labored here in the midst of a vast tropical ocean. We gaze with wonder and admiration on the comet that returns to the earth after the absence of a thousand years. But is not the return of these particles of matter still more wonderful and astonishing?

We burn, perchance, to-night, the carbon of the fagots which Abraham kindled on Mount Moriah; we feed our lamps with the oxygen that fed the flame of the burning bush; and quench our thirst and bathe the feverish temples with the water which the woman of Samaria drew. The dew that fell on far off Hermon's mount twenty centuries ago, may be descending on our prairies to-night. The savor lost from the salt on old Judea's plain, dissolved in the waters of the great ocean, comes, at length, to flavor and preserve our food. The water, which gushed from the smitten rock for the thirsty Israelite in the distant wilderness, through another smitten rock on the confines of our city, may yet furnish the refreshing draught to the modern Israelite while seeking his promised land in the distant West.

Sometimes a single element, by its great range of affinities, is capable of entering into combination with almost every variety of organic and inorganic substances, helping, in turn, to form acids and alkalies, food and poison, flame and its extinguisher. Yesterday it may have assisted to make the sourness of vinegar, to-day to add to the sweetness of sugar, and to-morrow may be the ingredient of a substance devoid of any taste.



A particle of oxygen may be to-day in a state of purity in the laboratory of a chemist. To-morrow it may unite with some metal to form an oxide. Becoming again disengaged, it may combine with hydrogen to form water; taken up by some plant, it may help form vegetable tissues; devoured by an animal, it passes into blood and thence to muscle and so on through all the changes of mineral, vegetable and animal existences—feeding metal, plant, beast and flame—drank up, eaten up, and burned up, it at length appears undigested and unconsumed; and He, who has “numbered the hairs of our heads,” and who “suffereth not a sparrow to fall to the ground without his notice,” will still keep that little atom of oxygen as “in the hollow of his hand,” undecayed and undiminished to fulfill other rounds of mineral, vegetable and animal existence through the ceaseless ages that are to come.

But it is in the department of animated nature that the changes of the particles of matter are the most striking. Of the countless animals and plants, that existed a century ago, scarce one remains. Most perished within a decade of their birth; some lived but a season, others but a day. But their places are now as well filled as if no one had ever felt the destroyer's hand. Life follows so closely in the footsteps of death, that his track of ruin is scarcely marked.

Every twilight that dawns upon the earth, lights up the morning of a new creation. For us, as in the days of which Moses wrote, “The earth,” at the command of God, “brings forth grass, the herb yielding seed, and the tree yielding fruit.” Now, as then, do “the waters bring forth abundantly,” and every night God looks upon some new created object, and “behold it is very good.” Ever some hand is rolling away the stone from the door of the sepulcher, and the living come forth from among the shrouds of the dead.

Decay is no less an element of progress than is growth, and in the broad, rich furrows of death, God is constantly scattering the seeds of life. “The grass withereth, the flower fadeth, and man goeth to his long home;” but from the withered grass, the faded flower, and the dead man, forms shall arise equaling or surpassing in beauty and usefulness those that have passed



away. "The mountain failing, cometh to naught;" but on the spot where the barren mountain stood, and over the valley where its darksome shadow rested at noonday, ten thousand palm trees raise their rejoicing arms to heaven.

In truth, the rapidity and luxuriance of growth have always a direct relation to the quickness and abundance of decay. In the cool dry atmosphere of Siberia, where decay and putrefaction are so greatly retarded, vegetable life is equally slow and measured. But in the warm moist valley of the Amazon, where the living animal of yesterday becomes putrid to-day, a century of Arctic growth is crowded into a single year. In Siberia, the animals of a former age and extinct race still remain preserved. But in Brazil, the over-laden beast scarcely falls to the earth, before hordes of insects commence to revel on its decaying flesh. And here, too, the branch of the tree, broken by the weight of its luxuriant foliage, no sooner reaches the soil than the work of decomposition commences.

In the relentless warfare that has so long been waged between growth and decay, neither has gained a final triumph or effected an absolute conquest. The barren fig-tree which so long cumbered the ground, at length ingloriously perished; but from the soil made rich by its decomposed leaves and branches, a grape-vine invitingly hangs out its purple clusters in the ripening sun. The prairie-pointer and scarlet painted-cup, another season, will blossom in profusion on the very spot, where, a little while ago, the loathsome rattle-snake coiled its hideous form, and hissing, died amid the waving grass.

The greedy ox devours in a single day the rich herbage of a rood of pasture land, and inhales during the same time a corresponding amount of life-giving oxygen. Of both of these the destruction seems complete; for the product of their union is a gas poisonous alike to man and beast. But, strange to say, this noxious, poisonous vapor not only furnishes the grass the material with which to repair its mutilated form and to construct other new leaves to be in their turn devoured; but it enables it to give back to the passing breeze the oxygen of which it was so lately deprived. Thus the beast gives life to the plant as the plant gives life to the beast.



A fire rages through our great city; block after block, square after square are consumed by the devouring element; man mourns the loss as well he may. Meanwhile, on distant Manitouline, and the nearer shores of Michigan, in the forests so long desolated by the chopper's axe, a day of rejoicing is held among the solemn pine trees.

Sometimes, on a summer day, I have stood on yonder sentinel's tower and watched the fleets of vessels with their cargoes of fuel, nearing our harbor; the long trains of cars, freighted with produce, approaching our warehouses; and the lines of wagons laden with fruits and vegetables seeking our stores and markets. A week passes, and the rich cargoes have disappeared. The fuel has been consumed in cooking food, generating steam, and melting iron. Horses have devoured the hay and grain, man has eaten the residue. The vessels, the cars, the wagons must hasten away and return with another supply, or the fires will go out, the engines will stop, the horses will starve and man will hunger. In truth, this must be repeated every day, else want and suffering are at our very doors. Thus a single great city may destroy the surplus produce of a whole vast province.

But can the fields and forests endure this constantly repeated exhaustion and receive nothing in return? Ah, no. They can not and they do not. God, who "made the country," is ever caring for her wants. From every gutter, sewer and cess-pool; from every ventilator and chimney, He is gathering up those gases hurtful to man—ammonia and carbonic acid—and on the chariots of the winds is transporting them to the shorn meadows, the harvested fields, and the devastated forests. No extortionous tariffs on these rich cargoes, no delay of trains, no sinking of ships. On heaven's highway all things are transported free; all cargoes are safe! Thus is it also true, God *feeds* the country, "man the town."

Sometimes, whole countries are like cities in respect to being consumers. England, with a soil productive only by means of imported manures, whose very sunshine is but a mild dilution of sunlight with fog and smoke, lives at the expense of more favored climes. Her ships encircle the earth, and bring to her mar-



kets the productions of every land. The grains of Illinois, the wines of France, the fruits of the Mediterranean, the teas of China, the coffee of Java, and the sugars of the West Indies, are as plentiful among her people as with those that produce them. Not only are the English people indebted to the Gentile world for what they eat and drink, but also for what they breathe. Her home supply of oxygen—the food alike of man and flame—would scarcely suffice them a fortnight, and then, but for an American importation, their furnaces must, from necessity, stop manufacturing rebel cannon, their orators cease breathing out insolence and bravado.

How much good air does London, with its millions of people, thousands of fires and hundreds of furnaces deoxydize and render poisonous! What ceaseless streams of vitiated air flow seaward from above the great noisy metropolis! Meantime, far away, the vast forests by the Amazon, the broad plains beside the Ganges, and the fertile prairies along the Mississippi, take up this rejected air—this carbonic acid—separate it into oxygen and vegetable tissue—cotton, ship-timber and wheat—and in another year or another generation, they are transplanted back to the same great metropolis to be again eaten up, worn out and formed.

Great and valuable in the commerce of the land; greater and more valuable is the commerce of the ocean; but infinitely greater and incomparably more valuable is the commerce of the air! It passes from empires to republics, from states to kingdoms, unchecked by duties, unmindful of the custom-house. It enters harbors where sails were never spread, and brings its treasures to pauper as to merchant prince. It creates ports of entry where man has never trod, and discharges cargoes on islands the explorer has never visited. Financial revulsions may check, for a time, the commerce of the land; blockades may sometimes shut out the commerce of the sea—but in peace or war, in seasons of plenty or times of famine, the exchange of commodities from destroying man to creating plant is ever unchecked and uninterrupted.

Varied and wonderful is the commerce of the air. It brings us not only the food for plants and the breath for man, but the



perfume of flowers, the song of birds, the drop of evening dew, and the ray of morning sunlight. "There is none great but God," and in no way is his greatness better manifested than in the commerce of the air.

And shall man, formed like the beast and plant from common dust, be exempted from the great law of dismemberment and decay when death has overtaken him? Shall he, that has so long and so relentlessly robbed the air of its birds, the sea of its fishes, and the earth of its flocks and herds, never be compelled to make restitution to the air, the ocean and the soil? Shall he, that fed on the choicest plants, now deny the plants the poor privilege of feeding upon him? Shall man, that often acts a less acceptable part while living, be less useful than they when dead? Ah, no.

"Earth that nourished thee, shall claim  
Thy growth, to be resolved to earth again;  
And, lost each human trace, surrendering up  
Thy individual being, shalt thou go  
To mix forever with the elements."

"Dust thou art and unto dust thou shalt return," is the solemn sentence pronounced on all that live; nor can any circumstances long delay or essentially modify its literal exactions. The final result is all the same, whether the cherished form is borne like that of our martyred President to consecrated ground through countless cities draped in mourning, while weeping millions check the progress of the bier; or like the corpse of his detested assassin is hurried secretly and at midnight, to an unknown grave in unhallowed earth. A common fate, at length, awaits each human form, whether like Cromwell's, it is desecrated years after its interment; or like Napoleon's, which after years of dishonor on an enemy's island, was brought back to his beloved capital at the head of a triumphal procession, such as never accompanied the living conqueror.

"We are as near to heaven on the sea as on the land," said Humphrey Gilbert to his companions in the sinking ship. So, too, we are as near the dust whether resting beneath the dome of St. Peter's or sleeping amid "the clods of the valley."

How vain it is to seek after death, to locate or long retain the little quantity of matter that once belonged to the living man. Why grapple for the drowned mariner beneath the waters of the lake or ocean? Why seek the miner suffocated amid the debris of the fallen gallery? Why search the Arctic snows for the remains of Franklin? Is it more glorious to feed an English willow than a polar bear?

"Dust to dust," is the cry nature is ever sounding to call home her own. Hudson answers it from the billows of the great sea that bears his name; De Soto from the mighty river which he discovered; Irving from his quiet home beside the beautiful Hudson; Percival from among the lead mines of Hazel Green.

But does the contemplation of these physical operations impart to us no moral lesson? Verily, it does. It teaches us, that this little mass of corruptible matter, which we now call our own, but which others so lately claimed, and still others will soon arrogate to themselves, should be used, during our brief ownership, only for the highest and greatest good. It admonishes us both by the much we have to do, and by the brief interval in which we must accomplish it; for never did greedy expectant heirs wait more impatiently for the miser's gold than do the hungry plants await our death. It exhorts us to be faithful, earnest teachers; attentive and thorough students. It bids us in a thousand voices to be "diligent in business, fervent in spirit." It reminds us of the physical and intellectual good we have received from others, and appeals to us that we repay the debt of gratitude. It re-echoes the words of the great Physician, "freely ye have received, freely give."



# Faculty of Hahnemann Medical College.

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Small, A. E., jr.	Illinois,	Profs. Small & Hale.
Small, H. N.,	Illinois,	Profs. Small & Hale.
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Smith, Frank,	Illinois,	Dr. Pratt.
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Ulrich, Raimund,	Illinois,	Dr. Ulrich.
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Wyatt, W. H.,	Illinois,	Dr. Foster.
Wheeler, B. A.,	Wisconsin,	Dr. Patchen.
Weed, T. J., M.D.,	Kansas,	Practitioner.

## Graduating Class.

NAMES.	SUBJECT OF THESIS.
Eugene W. Beebe,	Iodide of Arsenic.
Lucius E. Clark,	Follicular Enteritis.
Charles W. Clark,	The Liver.
Edward Cowles,	Typhoid Fever.
C. H. Coggsell,	Eryngium Aquaticum.
George E. Chandler,	Manstupratio.
J. Deville Dennis,	Craniotomy.
T. Cation Duncan,	The Dispensary.
O. E. Goodrich,	Man a Unit.
Frank W. Gordon,	Scutellaris latriflora.
H. T. F. Gatchell,	<del>the</del> Bani as Adjuncts to Homœopathy.
W. G. Jones,	Senecio aureus.
C. H. Lutes,	Sticta pulmonaria.
James Emmett Morrison,	Menstruation.
Charles W. Miller,	Endo-Metritis.
O. H. Mann,	Practitioner.
A. Burton Nichols,	Phthisis Pulmonalis.
Ephraim Parsons,	Pseudo Membraneous, Croup, and Diphtheria. Bromine as a Remedy.
Clinton W. Pearce,	Ptelia Trifoliata.
M. F. Page,	Diphtheritic Paralysis.
I. G. Rishel,	Intermittent Fever.
W. F. Sherman,	Reflex Action of Spinal Cord.
Alvan Edmund Small, Jr.,	Intermittent Fever.
Henry Newell Small,	Epidemic Cholera.
Leland Walker,	Myrica Cerifera.
W. H. Woodbury,	Clinical Practice.



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