

1879

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Recommended Citation

Winchell, N. H. (1879). Annual Address of the Retiring President. *Journal of the Minnesota Academy of Science*, Vol. 1 No.6, 389-401.

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ANNUAL ADDRESS OF THE RETIRING PRESIDENT

BY PROF. N. H. WINCHELL.

(READ JAN. 5, 1880.)

Ladies and Gentlemen, of the Minnesota Academy of Natural Sciences: The round of another year brings us to the annual meeting at which, on the expiration of their terms of office, the officers of the Academy are required to make their yearly reports, and the president is expected to address you in a more formal manner than is usual at our regular monthly meetings. In vacating the position to which your partiality elected me a year ago, it seems appropriate to indulge in a few reflections on the past and a few anticipations for the future. In reference to our history, we have but a brief period to review. The Academy was organized in the winter months of 1873. The first informal meeting was called by Drs. Simpson and Rogers, and met at Dr. Johnson's office, on the east side of the river, or in what was formerly the city of St. Anthony. At a formal organization a few weeks later Dr. Johnson was elected the first president of the Academy, and the regular meetings were held at his office during the following three years. As it seemed necessary on the growth of the membership to meet at a more central and accessible point, the collections were transferred to the west side of the river, and placed in the rooms which we have occupied ever since. The successful establishment of the Academy in comfortable rooms, furnished with suitable cases and seats, was effected largely through the labors of Drs. P. L. Hatch, A. F. Elliot, and

A. E. Johnson, and Mr. G. W. Tinsley, and was an event in the history of the Academy in which we greatly rejoiced. Dr. Johnson served as president during three successive years, and was again elected and served one in 1878, the intervening years of 1876 and 1877, the chair being filled by Mr. R. J. Baldwin.

If we inquire now: What has the Academy done during the seven years of its existence? we ask a question which has a complex and manifold bearing. Of things tangible and outward we may say :

1. It has gathered together a collection of objects into a museum of geology, mineralogy, ornithology, archæology, and zoology, which, though not large, makes a creditable beginning, and which, with some labor at cataloguing and labeling, would be highly instructive and useful. During a portion of this time it has kept its rooms open certain days for the free admission of visitors.

2. It has maintained courses of public lectures from time to time, at some of which there have been large audiences, instructed by some of the leading scientists of the day.

3. It has maintained its course of monthly meetings, which have been open to the public, at which the papers read by members have been discussed; and more formal lectures have been given, sometimes by members and sometimes by gentlemen from neighboring towns.

4. It has published annually a bulletin containing some of its proceedings, which has been sent to nearly all the scientific associations of a similar character in the world, and in exchange for which the Academy has received many valuable publications from other societies.

In short, it has subserved all the purposes for which it was organized. It has not only done this, but it has done more. There are many invisible influences that it has exerted. It has organized the scientific labors of the city. It has stimulated thought and observation. It has encouraged the young

scientist. It has provoked the discussion of questions of immediate as well as remote importance to the city. It has instructed the public. It has advertised the city of Minneapolis. It has sent an authoritative voice from the New Northwest to the uttermost parts of the earth. It has placed Minnesota by the side of Iowa, Illinois and Missouri. It has occupied the place, as it has the name of being, a State Scientific Association.

During these years through which the Academy has passed there has been no time, perhaps, more trying or more calculated to call upon us to consider our state and prospects than the present. I suppose every undertaking of this character has experienced its trying days. When they came, through the indifference of its members, through the feeble aid of the public, through the calamity of fire or misfortune, through dissensions in its own rank and file, or through several of these causes united, the institution died ingloriously, or recovered and spread wider its usefulness, according to the wisdom and devotion of those who had the good of science and civilization at heart, and who, convinced of the necessity of united effort and harmony in scientific labors, were willing to sacrifice still more either of time or money in fresh plans and new achievements. Which of these results shall be the experience of the Minnesota Academy of Natural Sciences?—to die ingloriously or "arise and shine," depends on us to decide. We have nearly reached the deciding point. Let it not come upon us unawares.

It may be well at this point to reconsider some of the reasons for the organization and maintenance of such an institution in the State of Minnesota and in the city of Minneapolis. It may be that the people of Minneapolis do not quite appreciate the circumstances, and do not realize the good that such an academy of science exerts on the material and intellectual welfare of the city. I am sure that if they fail to respond to appeals for aid it is because they do not know the struggling condition of the Academy, or do not understand the sphere which the Academy is trying to fill.

It would seem almost unnecessary at this period in the nineteenth century to multiply arguments for the support and spread of scientific labor and scientific knowledge. If there is anything in which the nineteenth century can boast, it is in the achievements of science. Already it stands far ahead of all others. We cannot open our eyes and tread our streets without constant contact with the useful and elevating discoveries and inventions of science. Our literature, our thoughts, our lives, are permeated with its influence. Our language takes on its terms of expression, and the very changes which it experiences—whether forced and intentional, or slow and natural—are explained and justified on "scientific" grounds. The literature of science, the claims of science, are recognized known, honored, far beyond the recognition given to them at any other period in the world's history. The progress of science in the past hundred years has reacted upon other branches of knowledge, and stimulated to renewed energy the older systems and fields of human labor. If it has overturned some it has established others on surer foundations. It has everywhere been victorious, and even to-day we hear the ringing pean of another battle fought and won, an invention which has been literally wrought out on purely scientific grounds with only scientific material—former discoveries—to manipulate with, a victory that will place the name of Edison by the side of Faraday, Fulton and Morse.

But more particularly, we wish to inquire, why in this state and city a liberal encouragement should be given to the prosecution of science. Here we may begin by saying that the inducements that existed for the inception of the Academy of Sciences seven years ago still exist and remain in force for its continuance. The ardor of some who began with us may have paled with the lapse of seven years, but the *valid reasons* all remain.

I. OUR GEOGRAPHICAL POSITION.

Many a time has reference been made to the assertion of Mr. Seward, that at no distant day an empire of wealth, in-

telligence, civilization and population would arise in the region we occupy; and the events of every day are hastening to prove the astuteness of his prophecy. We are near the centre of the fast growing parts of the Union. Both to the east and to the west of us stretches out the great continent of America, all under the same systems of law, education, society, and commerce, and settled by the same invincible Anglo-Saxon race. This is an advantageous position; for the resources and intelligence from both wings of the continent are equally at our command. The great thoroughfares of travel pass through our borders, and the information that travel disseminates, instructs our people and brings to their doors the best and newest methods of labor, while at the same time it advertises and recommends our state to the rest of the world. Certain other physical conditions probably entered into the elements that went to form Mr. Seward's judgment; and as they coincide with our reasons for permanently establishing a prosperous Academy of Sciences in Minnesota, we can do no better than enumerate some of them.

We are on the great Mississippi river and embrace within our borders the head of navigation of that vast stream. If we say nothing of the floods of travel and traffic that pass annually up and down that valley, and the income of wealth that it pours into our borders, we may at least refer to the magnificent display which nature has here made of one of her greatest pieces of workmanship. We not only have the mechanics, the hydraulics, and the problems of flood and drainage that interest its navigation, constantly before our eyes to observe and study, but we have all the multitude of fauna, of fish, reptile, bird and insect which it introduces within our limits, to collect from and enrich our museum, and to study. We also have its geological history to unravel and its fossil life to describe.

We are equally fortunate in being situated contiguous to the greatest body of fresh water on the globe. Lake Superior with, its diversity of aspects, and its varied aspects of geology

and biology, will alone furnish enough material for careful examination and classification, to keep our Academy busy for twenty-five years, if it should devote its energies to that alone. There is, moreover, a vast almost unexplored interior west of Lake Superior within the borders of Minnesota, filled with undisturbed and unknown species of animal life, and sprinkled over with beautiful lakes which have not yet been ruffled by the footfall of either the hunter or explorer. These fields are all the legitimate grounds of scientific exploration, and fall within the scope of our Academy.

We are also fortunately bounded on our northwestern frontier by another large stream, which, while it complements the great Mississippi river in flowing in the opposite direction, and entering the great Mexican gulf of the North, likewise carries with it its volume of travel and trade, and has its own natural features of geology and animal life. Across the watershed between these great valleys pass the migrations of birds which, while they do not permanently belong to us, yet diversify our fauna by occasional halts, or perhaps sometimes make longer stays within our limits. This is peculiarly our own good fortune. While no other equal area embraces at once portions of both great valleys and of the great watershed, birds naturally follow the timbered regions for shelter. This fact causes them to adopt Minnesota, as their line of transit, both for being shorter from water to water, and because the timbered belt of the north is more nearly continuous with that of the south across our eastern and central counties than at any other place west of the great lakes. The valley of the Mississippi, combined with the influence of the lower Minnesota and the Leaf Hills moraine, serves to extend our central belt known as the Big Woods nearly to the southern line of the state. We are thus not only on the lines of east and west travel, but also hold the water-shed across which passes the most voluminous north and south annual migrations.

Again, we have within our limits a large fertile area of prairie. We hold the eastern edges in our latitude, of that

great treeless tract which extends indefinitely westward. This brings within our purview all the questions that are involved in the examination and discussion of the prairie itself, its origin, nature, resources, soils, products, climate, drainage; its botany—a book of its own kind, *sui generis*—its fauna (including the grasshopper), to say nothing of the matchless wealth of wheat which it produces. These are all incentives to scientific investigation—all opportunities that furnish means for the instruction of the public, and the increase of everybody's comfort and happiness.

We have on our northern boundary, besides, an active and enterprising rival, one of our own race, our own cousin, the Canadian, who by his energy and industry is determined not only to subdue the wildness of the country and attract the settler by his liberal public improvements and superior civil institutions, but also to take from our doors the credit of dealing with and deciding the interesting problems which are to a certain extent common to us both. We should be awake to the necessity of work. We should have our agents, our collectors, our surveyors organized and ready, or busy in the development of the economical and scientific issues that await the hand of science along our northern frontier. Minnesota cannot afford to be idle in this field. Minnesota, *the Star of the North*, must shed its own light on these dark corners, at least so far as they lie within our own territory.

These are some of the incentives to scientific work that pertain to and grow out of our own geographical position. There are other features peculiar to Minnesota which could be mentioned, features which having more or less bearing on the health and happiness of the people, will some day receive full consideration, but which I can no more than allude to. I refer to the climate of Minnesota, the temperature of the air, the rainfall, the dynamics of the atmosphere as they are displayed in our state—the contrasts and resemblances which we present when compared with other states in the same latitude, or in the same longitude. In geological science also, and in

the field of archaeology, as well as other branches of zoology we possess peculiarities and opportunities which call upon us to enter these fields vigorously. These also arise largely from our fortunate geographical position.

2. COMPARISONS.

Let us make a few comparisons. If we revert to the early history of eastern cities what do we find to be the status of scientific labor? Whether we choose Boston, or New York, or Philadelphia, the metropolises of the East, we find flourishing academies or societies of natural as well as physical science. These were begun in the first years of their history. They have grown as the wealth and population grew. They are now the promoters of science and invention. They are authorities to which we go for counsel. They attract not only scholars, by the literature which they have disseminated, but the practical mechanic and inventor are drawn thither to work out their designs, by the aid of their collections, their libraries and their sympathy. The presence of the scientist invites the inventor. The inventor requires the mechanic. The mechanic introduces a host of new industries, and also amplifies those already there. The newspaper opens its pages and spreads the intelligence before the world. General attention is called to the enterprise, growth, wealth and culture of those cities. Is it a wonder that they grow, and that they are the axles round which revolve so much of the wealth and influence of the United States? Let us suppose they had neglected such opportunities as we now possess, and that in their trying days those pioneer societies had expired. Can we believe that the power of those cities on the American continent would have been so great, and that the inventive Yankee nation would have been able at this day to rival the world as it does, in mechanical and inventive skill?

Their example has multiplied its influence and has resulted in the establishing of many other organizations in those states. In the state of Massachusetts are twenty-three scientific societies. New York state has the same number, and Pennsylvania has ten.

If we come further west we find the same spirit following the course of immigration and settlement. In Ohio we find fourteen societies, located in the principal cities, and exerting for that state the same influences that radiate from Boston, New York and Philadelphia. In Illinois are twelve. In Indiana are seven. In Wisconsin four. In California seven. In Iowa four. In Minnesota—if we allow the extinction of the Minnesota Academy—we may now say practically *none*, for the Historical Society does not profess to engage actively in science, while the Winona society is an adjunct simply of the normal school at that place, and the St. Paul Academy has been "buried" in the State Historical Society.

3. OUR OWN BENEFIT.

If we consider the question from an entirely selfish standpoint, and ask what good to ourselves—I mean Minneapolis and the state of Minnesota—the Academy may bring, I will answer:

1. The Academy is *educational*. It would neglect one of its chief ends if it failed to educate. Its means are lectures, discussions, publications, museum. It has during its brief history disseminated much information. It has had its rooms filled weekly for months with youth who have learned the rudiments of mechanical drawing. Large audiences have heard the lectures of Proctor, Morse, and others. Such an institution cannot but educate if it live at all. There may be a form of organization without vitality, which would fail to educate, but an active prosecution of science, in any of its fields, necessarily is a process of personal and of public education.

2. Our *material* welfare is promoted by the existence and work of such an Academy. We have one of the greatest water powers in the northwest in the city of Minneapolis, and another on the St. Louis river in the northeastern part of the state. A wide, level tract of country to the west of Minnesota which is nearly destitute of water power, which will have to depend for its manufactured articles either on the imported products of eastern states or upon those that may be produced

in Minnesota. It is easy to see that where water power and fuel both exist, and the shortest lines of transportation coincide to invite manufacturing enterprise, with a sure market, there manufacturing industry will spring up. Gentlemen, we have only a foretaste of what we are to see of this industry. Every pound of the water power of Minneapolis will be in demand, and will be used over and over again. The dalles of the St. Louis are destined to lose their wildness and their natural, untamed beauty, and to take on the beauty of usefulness; of flouring and lumbering mills, of diversified manufactures, of canals, locks, turbines, railroads and highways; and to cease from the roar of a thousand cascades, and sing with the whistle of the engine, the whirring of wheels, the buzzing of saws, and the rattle of a varied manufacturing industry. These things will not be long hence. They will need a scientific basis. They will need guidance, information. They stimulate invention. They demand the civilization of modern times. They demand books; they need libraries. They will have the man of science, and they will import him if he cannot be got without importation. Here is a wide open domain for scientific education to expand in. Our Academy should be one of the agencies (alas, I hope not the only one) to supply this demand for educated scientists.

Nor is it in the line of manufactures alone that the Academy is to serve the material welfare of the state. I have already stated the intimate connection between scientific knowledge and invention. Indeed it is almost impossible that invention should exist without scientific knowledge and scientific processes. In early days, when science was weak, and what one man knew nearly every man also knew, the first inventions or discoveries were more accidental. This was because of the very absence of accurate knowledge. But in our day invention is a process of scientific induction and skilled mechanics. What more powerful agency for promoting the good of our people, and the increase of inventions for the welfare of the citizen can be devised than an academy of organized scientific laborers?

Again, immigration is attracted by the development of science and scientific labor. I here class with scientific labor all manufacturing industry, as well as all skilled mechanical manipulation. I think I may fairly include in scientific labor all labor that is guided by scientific methods. There is a kind of labor that is automatic and unthinking. Even the details of scientific labor become that in some hands. But however automatic the labor may become, if its inception, its controlling power and its aims are governed by the laws and methods of science, it is none the less within the field of scientific labor. If we glance over the map of the United States and select those areas that are thickest settled, we shall select those areas where scientific labor has been carried to its greatest perfection, and these will also coincide with those of the greatest intelligence, culture and wealth. If again we glance over the map of the United States, and select those areas that are centers of scientific knowledge, and from which radiate the lines of advancing science, we shall also select those same most thickly settled parts.

There is a very close connection between immigration, settlement, wealth, and the prosecution of science. It will not be just to say that this coincidence does not show an interdependence. It is true that the same coincidence may be found to exist with the greatest amount of crime, with the greatest suffering and misery, or with the greatest immorality. But here we are speaking of the distinctive agencies and characteristics of modern civilization. If these things exist in greatest force where modern civilization is carried highest, they are there in spite of modern civilization: they are the plagues of modern civilization: they are not its auxiliaries, and cannot be said to distinguish modern civilization. They have always existed. They have been modified and ameliorated by modern civilization, and their coincidence with the greatest population does not imply that they promote civilization and attract settlement. They do not profess to. Neither would modern civilization admit such an influence. There is a mu-

tual repellant between them and modern civilization. On the other hand the relationship between settlement and population, and modern science with its devices for the comfort of man, is admitted and furthered. Modern civilization boasts of its progress is science, and science boasts of its benefits to civilization. Therefore an Academy of Science is simply, though secondarily, an academy for the promotion of intelligence.

3. Our *social* welfare is also promoted by an academy of science. Now the word *society* is many-sided, especially in its broad meaning. But I refer to those daily experiences of man with man, to the mutual independence which we as neighbors in a crowded city must admit that we feel, to the waves of feeling, or of local interest, that excite us as a community, and the common pleasures and entertainments that we seek, to our diversions, to our domesticities. Not only may the grander aspects of modern civilization be advanced by the cultivation of science, but these more personal and immediate concerns are influenced and mellowed by her genial light. Science provokes a quick and observing eye. She requires the cool and steady judgment. She skills the hand to its gentlest and nicest touch. She makes us tolerant of opposition, and willing to be corrected. She would harmonize our disagreements. She would systematize our efforts. She would elevate our ambitions. She would clarify our thoughts, she would regulate our pleasures, and she would enhance the happiness of our homes. She works in subtle ways, but none the less effectively.

4. Our *intellectual* and *moral* good is promoted by the existence of an Academy of Science. Whatever awakens the mind, whatever quickens the perceptions, whatever trains the judgment, whatever leads us into the mysteries of nature, whatever introduces us to the great plans and unsearchable wisdom of the Creator—these all elevate our existence and our aspirations—they conduct us “from nature up to nature’s God.”

4. THE GOOD OF SCIENCE.

But perhaps the most potent reason of all for the existence of an academy of natural sciences in Minnesota, is the aid it will render to science itself. I have already mentioned some of the peculiarities of our geographical position which call for special investigations in various branches of science. Every part of our national domain has its peculiarities, rendering it different from all other parts. It is only when these are all thoroughly investigated, and the results are compared and classified, that the science of our country will be fairly developed. The duty devolves on local investigators. Their discoveries must be known to the rest. They must be published to become of value; but they must be known before they can be published. We are but a part of a great whole, whose circumference is the world, and whose active principle is the *desire to know*. We can promote the advance of science by keeping our own duties well performed and notifying our co-laborers in other parts of the world of our progress.

When I appeal to you in behalf of science, I appeal in behalf of truth, for I think true science is the essence of truth. It is that which is known of nature's workings and phenomena. It cannot be science and not be truth. It is that truth which governs our lives from the cradle to the grave, which encircles the universe in its laws, and which will stand when everything else fails.