SCIENCE

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

INDUSTRIAL MUSEUMS AND EFFICIENCY[1]

ART and natural history are now represented in New York City by material equal to that collected in any of the chief centers of the Old World. More characteristically American, however, would be an adequate showing of our astounding agricultural, mineral and industrial wealth. The proper illustration of this could and should be given by a group of special museums, united under a common management, and working in thorough harmony for the common aim of national education. The special museums should be devoted to the following branches, each one of the institutions being complete in itself:

Electricity	Historic records
Steam	Health and hygiene
Astronomy and navigation	Textiles
Safety appliances	Ceramics and clays
Aviation	Architecture
Mechanical arts	Scenic embellishment
Agriculture	Horticulture
Mining	Roads and road-building materials
Labor	Commerce and trade
Efficiency	Printing and books

Fifty years ago there was no art museum, and no museum of natural history in this great city of New York. At the present time we have both, as well as a museum of safety, but the only technical art museum is that associated with the Cooper Union for the Advancement of Science and Art. This is a small, unique and valuable technical art museum founded by and

[1] From the address of the vice-president and chairman of Section I, Social and Economic Science, American Association for the Advancement of Science, New York meeting, December, 1916.

under the direction of the Misses Hewitt.

Industrial technical museums would give not only the employer and the foreman, but each workman, a knowledge of, and create an interest in his profession or trade, no matter how humble it may be. How many men know anything about the history, the development, the successive stages of the profession in which they labor or the material with which they work? How many bricklayers know anything about the origin of a brick, how it ought to be laid, how it will best hold? How many cement-mixers are there that thoroughly understand the fundamentals of cement and mortars, how they are made, and where obtained? Few carpenters and cabinet-makers know more than one or two woods, and those not thoroughly; whether a wood can be stained, or oiled; whether it is adapted to indoor work or outdoor work. Leather, one of our greatest commodities, is understood no better.

These, and all the lines of mechanics, electricity, etc., should be illustrated in such a way that the artisan would become more skilled. The result would be to raise the amount of his production, increase his earning capacity and make him less of a clock-time server. The production of the country would be correspondingly increased, greater resources being created with less effort. One should understand the industrial conditions of the country; where the resources are, and where they can be developed. Not only nations in Europe understand this about their neighbors, but some Asiatic countries as well.

In the preparedness for peace, we find a splendid field for the utilization of our projected museum of peaceful arts. There is a growing tendency to broaden and diversify our school system, by the introduction of many elements of instruction outside of the narrower school course and the school precincts, and this has found expression in the Gary plan, so successfully introduced in many places. Our museum of the peaceful arts would enable us to give a wide development to this phase of education. For we know that nothing impresses a child or a young person more strongly than a direct visual appeal. A complete concrete object set before children, adequately explained and, if possible, set to do its work before their very eyes, will be not only better understood by them, but also far longer remembered, than any woodcut with a text-book elucidation can possibly be.

This real grasp of the matter will prove of inestimable importance when the young person begins to undertake practical work in the industrial or art calling which has been chosen. The rate of progress will be much more rapid and exact practical results will be much sooner attained than under the old system.

As so much depends upon the expansion of our foreign trade, especially in South America and in Asia, a great desideratum is that a certain number of our young men should be given a special training in this direction. Such a training could be best acquired by means of a commercial schoolship, which would make semi-annual trips to various parts of the world, stopping for a longer or shorter time at the principal foreign ports. The commercial students, under the direction of competent instructors in the various branches of trade, would thus have the opportunity to study all the commercial proceedings at first hand from actual observation. They could learn in the most impressive way all the difficulties encountered in passing goods through the various foreign custom-houses, how the goods should be packed, in what shape the foreign importer most likes to receive them, and what are the rules and practises of our

chief rivals in the export trade. "Book-learning" is singularly inefficient in such matters, however competent may be the writers of manuals and guides; only actual contact with actual conditions will ever impart the kind and quality of knowledge that go to build up a thoroughly successful export business. The pleasant conditions of such a trip, the bracing and animating effect of the pure ocean air in transit from port to port, during which the students would have ample time to think over and note down what had been learned, would make this an unforgettable period in any young man's life, a period in which the foundations of his future success had been laid.

FERTILIZER AND NITRATES—DRAINAGE AND IRRIGATION

Two great problems in the United States to-day are: First, Is not our land throughout the entire country gradually becoming poorer? Is not our yield per acre becoming less, except in a small percentage of the land where modern methods have been used? The second problem regards the fact that the great cities of the country are taking the product of the land and returning none of it to the land, only piling up garbage heaps which even when burned are lost to the land whence the original material was taken.

In regard to the waste of valuable fertilizers in the disposition of the refuse of our great city of New York, the present speaker, in 1912, used the following words in a paper read at a meeting of the American Museum Association in New York:[2]

Here in the city of New York we are permitting 2,500,000 tons of refuse and human waste to go to the garbage heaps, to the sewers, and to pollute the rivers, at once spoiling a valuable source of food supply, and bringing disease to the inhabitants of the city, while if this material could be collected and spread over the barren fields of Long Island and New Jersey, these tracts might be made into garden spots of the earth. Furthermore, these same chemical products, after being turned into food and again into waste, could be utilized anew, thus constituting a kind of endless chain of usefulness. Furthermore, the waste of nitrates in urine alone represents over 50,000 tons annually.

[2] Presented by Dr. George F. Kunz at the International Conference relating to Program for Celebration of the Centenary of the Signing of the Treaty of Ghent, held in New York, May 9, 1913; p. 3 of reprint.

The unfavorable report of the United States Geological Survey on the nitrate deposits of this country clearly shows that in case of a sudden large demand arising from a state of war, this country must depend either upon the Chilean nitrate deposits, or upon nitrate derived from the atmosphere. The National Defense Act of June 3, 1916, contains an appropriation of $20,000,000 for the establishment of a plant for this purpose, and the European war has shown that a belligerent cut off from outside sources of supply can obtain at least part of the absolutely necessary nitrate, both for munitions and for agricultural fertilization, from the nitrogen in the air, although it has recently been stated on high authority that the great exponent of efficiency in Europe has been unable to provide a sufficiency for land fertilization, and that the productivity of the land is therefore decreasing rapidly.

If the United States government would establish three or more large depots of nitrate, so located as to be within easy reach of the various great agricultural complexes, storing a million tons or more in each one, the farmers would be able to supply their wants at will, and the government would be able to stabilize the price of the nitrate sold to them. The stocks could be constantly replenished, and would thus at once serve as a source of supply for agriculture, and also at a reserve for use in case of a possible war, when the boasted

freedom of the seas might be again subjected to violation.

The increased productiveness of the farm land would render it possible in case of war to enroll probably one third of the agricultural laborers in the army, or should their services not be needed, to use them for industrial enterprises or for the cultivation of additional land. How greatly the employment of nitrates as fertilizers has been increased in recent years is shown by the fact that while in the three-year period 1898–99, 10 per cent. of the nitrate of soda used in the United States was thus utilized, the figures for 1910–12 show an average agricultural use of 45 per cent., and in 1914 the percentage had risen to 55 per cent.

The necessity for doing something to stabilize the prices of nitrates is shown by the wide range they have shown during the past four years. The downward and upward trend of the price per ton in this period is reported as follows:

1913	$52.00	$43.00
1914	44.50	38.00
1915	37.50	80.00
1916	80.00	85.00

Thus the price toward the end of 1916 ($85) was more than twice what it had been at the beginning of 1915 ($37.50).

It is interesting to note that nitrate from the Chilean beds was already used by the Indians in the seventeenth century, both for fertilizing purposes and in the making of gunpowder.[3] The immense quantity of nitrate now taken by the United States and by European countries appears in the following figures, giving the consumption for the three-year period, 1910–12:

United States	1,509,700 tons
Continent of Europe	4,852,180 "
United Kingdom	381,960 "
	6,743,840 tons

[3] "The Nitrate Industry," by Señor Enrique Cuevas; pub. by Chilean Nitrate Propaganda, New York, 1916, p. 9.

The farmer who trusts to self-seeding of his land can use that land for pasture, but rarely for crops; whereas he who carefully sows his land, tills it, and enriches it, receives a splendid crop. As in the Parable of the Sower, some seed fell on good land, some on shallow land and rocky soil; some brought forth a hundred fold, and some blew away or was withered. So in the struggle of life, great men will sometimes arise from the lowest ranks in spite of all obstacles, but if many of these men had had some opportunities for development they would have attained their ends with infinitely less trouble and probably would have shown greater results.

The vital importance of carrying on drainage and irrigation work on an extensive scale becomes more and more apparent as the demand for agricultural products, both for home consumption and for export, becomes greater and greater. The public land still owned by the government, largely desert tracts awaiting irrigation, has been stated by Secretary Lane to have an extent of 250,000,000 acres. This constitutes a great and valuable reserve which must be utilized in the near future. For, even with the better fertilization, with the more intense cultivation so imperatively demanded, the rapid growth of our population and of the foreign demand make it necessary to enlarge our agricultural acreage to keep the prices of our stable products within reasonable bounds.

The reclamation of swamps is one of the most important problems of the present time. Many of the best lands of America are still in swamp form, and the sanitation produced if this land were reclaimed would more than pay for the work necessary, by the increased healthfulness of the country. The draining of the swamps is one of the best means of destroying the breeding places of the mosquito, and the extermination of the mosquito is one of the great

issues of the day. It was this extermination that made the Panama Canal possible, and has rendered Havana a justly favored health resort.

The acreage of unreclaimed and practically worthless swamp land in 1908, was stated by Hon. James Wilson, Secretary of Agriculture, to be 79,007,023 acres, and he estimated that reclamation would make these lands worth nearly $1,600,000,000, and that the value of their annual produce would amount to $273,000,000.

For the development of commerce, waterways play a most important part and the work done in this direction would fall in line with that carried on in drainage and irrigation. Our great natural waterways must be constantly supplemented, and their usefulness as channels of commerce must be increased. Nothing has so powerfully fostered the interior commerce of central Europe as the great canals uniting and extending the natural waterways, and in our own land we have striking examples of this. In such undertakings our citizen soldiery, with their special training, could be utilized in a way most valuable for the commercial interests of our land.

The great war has shown us what wonders scientific training can accomplish in destruction and devastation. Let us hope that the United States may continue to offer the world an object lesson of the value of peace arts, and that the magic wand of science may continue to be used by us for the works of peace, or, at the worst, for the defense of the freedom of our fair land against any and all ruthless aggression.

GEORGE F. KUNZ

SCIENTIFIC EVENTS

DECLINE OF GERMAN BIRTH RATE

THE Amsterdam correspondent of the London *Times* writes that although it is difficult to sift the truth from the reports which constantly reach Holland of increasing mortality in Germany, there is enough evidence in them to indicate a decline in the national vitality. Apart from causes connected with the war, there are others affecting the birth-rate to which attention is drawn by the German press, which comments on the "shameless" extent to which recourse is had to artificial means of restricting the natural growth of the population. Strong measures, it would appear, are being contemplated by the authorities to counteract the fatal effects of a policy of calculated sterility. In addition there is an enormous falling off in the number of marriages. In Berlin the number of marriages has been declining; in 1915 there were 16,622, and in 1916 13,966. With this decline there goes a decline of births and a large number of deaths.

The Amsterdam Bureau of Statistics in its weekly report compares the vital statistics of several large German towns with those of Amsterdam for the 10 weeks from November 5 to January 13. The following table, compiled from the Dutch figures, will be found instructive:

—	Amsterdam (Pop. 626,470)		Hamburg (Pop. 1,050,690)		Berlin (Pop. 1,798,962)	
	Births	Deaths	Births	Deaths	Births	Deaths
Nov. 5-11.....	255	126	179	403	387	744
Nov. 12-18.....	271	137	200	446	378	689
Nov. 19-25.....	259	143	118	422	415	736
Nov. 26-Dec. 2	279	131	196	417	370	715
Dec. 3- 9.....	269	167	177	534	373	705
Dec. 10-16.....	281	177	149	461	383	780
Dec. 17-23.....	253	225	219	407	376	849
Dec. 24-30.....	331	243	204	474	376	853
Dec. 31-Jan. 6	237	159	169	363	394	619
Jan. 7-13.....	271	194	178	426	377	699

It will be observed that in one week, December 24–30, the number of births in Berlin was only 45 in excess of the number in Amsterdam, although the population is only 80,000 short of three times the size of that of Amsterdam.

Two other large German cities are included in the comparative statistics of the Amsterdam Bureau. They are Leipzig and Dresden. Leipzig has a population of 676,289, or 50,000 more than the population of Amsterdam. In the week ended November 5–11 the births in Leipzig were 108, compared with 255 in Am-