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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 60,

For the Week ending February 24, 1877.

PUBLISHERS' NOTICE.

New subscriptions to the SCIENTIFIC AMERICAN and the SCIENTIFIC AMERICAN SUPPLEMENT will, for the present, be entered upon our books to commence with the year, and the back numbers will be sent to each new subscriber unless a request to the contrary accompanies the order.

Instead of a notice being printed on the wrapper, announcing that a subscription is about to end, the time of expiration is now denoted in the printed address each week, so that the subscriber may see when the period for which he has prepaid is about to expire.

FOR POSTERITY—A SUGGESTION.

The Irish gentleman who declined to aid an enterprise for the benefit of posterity, remarking that posterity had never done anything for him, was, after all the sport made of him, no unfair representative of the bulk of mankind. There is talk enough about doing great things for the advantage of future ages, but the real motive is apt to be something very different. To perpetuate their own name or fame, men or nations often set up lasting monuments, and sometimes unintentionally convey thereby to after times a few more or less instructive indications of the artistic or industrial skill of their day and generation. To further their own immediate ends, or to secure some benefit to their immediate descendants, men frequently undertake great material enterprises, and sometimes the work so done remains for ages the source of perennial good. But very rarely, if ever, can it be said that any work of man was undertaken solely, or even chiefly, for the benefit of posterity—more rarely still, for remote posterity.

Hence it happens that we owe far more to accident, to fire, rapine, volcanic outbursts, and the protecting care of desolation, for the knowledge we have of times long past, than to any intentional legacies of art or learning left us by the men of those times. The lost and abandoned tools, weapons, and ornaments of the stone age are all that we have to tell us of the childhood of humanity. Had no fiery disasters ever overtaken the pile-dwellers of the Swiss lakes, we should probably have never heard of such a people.

To the mud and ashes of Vesuvius, rather than to the historians of the Roman Empire, we owe the best of our knowledge of how Roman cities looked and Roman citizens lived eighteen hundred years ago. In the fragments of a *terra cotta* library, buried in the ruins of a royal palace, we find almost our only records of the arts and sciences of ancient Assyria. Under the ash heaps of a forgotten age, in Cyprus, Cesnola finds the only known vestiges of a primitive civilization, reaching far back into the domain of mythology. Thanks to the destroyers of Troy and Mycenæ, and the protective care of temporary oblivion, Schliemann is now able to verify tradition and lay before an astonished and delighted world numerous precious relics of heroic ages hitherto remembered only in song.

Who can estimate the value of these and similar findings to us—the value of the revelations they bring of man's condition in those remote ages? Who can say how many or how few the ages will be ere the time comes when the antiquaries of the future will be rejoicing over equally fragmentary vestiges of the doings and possessions of our day?

On the other hand, who can estimate the value of the knowledge lost beyond hope of recovery, or the checks to human progress experienced, in the repeated wiping out, so to speak, of the higher races and the civilizations they embodied? And who can say that similar disasters may not come again and again to humanity?

Suppose a pestilence peculiarly fatal to the white race should fall upon the world to-day, crippling, perhaps exterminating, the now dominant civilized nations; how long would the material elements of our science and art or general culture remain with power to enlighten the barbarous tribes that would inherit the earth? Human progress has more than once been set back for centuries by such natural or unnatural causes, leaving the sites of once splendid civilizations to be overrun with barbaric hordes knowing nothing of the better times that went before.

Suppose, again, that, by one of those geologic changes so numerous in the history of our unstable globe, the existing continents should sink a thousand feet. Every center of modern civilization would be submerged. The great social and political organizations of humanity would be broken up, and in the wreck of nations that would ensue very little of the glory and culture of the race could survive. The earth is dotted with vestiges of lost and forgotten empires. Can we reasonably assume, in the face of such facts, that the nations of to-day are immortal?

The question is: Shall we continue to trust to chance, as all other civilizations have, for the preservation of the conquests we have made among the forces and secrets of nature; or shall we do something positive for posterity, and leave the ages to come some certain and abiding legacy of our treasures of art and learning?

It may be that human progress will go on and on to the end of time without a break; that in the course of centuries mankind will surpass us in civilization, knowledge and power, as much as we surpass the earliest and rudest men we have yet found traces of: maybe infinitely more.

In such a case, what would not the scholars of, say the year 5000 A.D., or any other future age, be willing to give for a comprehensive picture of humanity as it exists to-day—for a reasonably complete library of our literature, science, and art? We may safely assume that nothing of the sort will be possible if matters are left to take their natural course. By that time every structure, every machine, every book, every work of art, now in use or stored away in our libraries and galleries of art, will have disappeared, a prey to time, the elements, or the more destructive violence of man.

On the other hand, it may be that, through repeated disasters of one sort or another, mankind, three thousand years hence, will have lost all the knowledge men ever possessed, and be slowly struggling upward for the hundredth time from inherited barbarism. In such a case, what enormous benefits might not accrue to man from a fortunate opening up of the wealth of knowledge we possess!

In any supposable case between these extremes of progress or degradation, a legacy of art and learning, such as we might easily set apart for remote posterity, would certainly be acceptable, perhaps extremely useful. Besides, it might be possible for us to set such a worthy example to those who shall come after us that, come what might, humanity would never be left absolutely void of the means of instruction, nor any worthy human achievement be absolutely lost or forgotten. The experience of these later years has demonstrated the value of such legacies even when unintentional, unselected, and wretchedly fragmentary. It has made clear also how a legacy deliberately made may be indefinitely preserved.

Roughly outlined, the carrying out of such a truly philanthropic enterprise would involve nothing more difficult than—

First. The construction of a practically indestructible treasure chamber in some secure place; and

Second. The preparation of a library well calculated to withstand the corroding tooth of time.

Two kinds of structures would meet the first demand—massive pyramids of covered earth or of solid masonry, or chambers hewn from the heart of some granitic hill. In low latitudes, where glacial action is not to be feared, the pyramidal form might be preferable: in more northern regions the rock-cut chamber would probably be at once cheaper and more durable. In either case, an elevated site should be chosen as a safeguard against submergence.

To secure the permanence of the records would be more difficult. Ordinary books and papers would clearly be unsuitable for long keeping; though for comparatively limited periods they might answer if securely packed in airtight waterproof cases. Nothing liable to spontaneous decay should be admitted. Stereotype plates of metal would be even more open to objection than printed sheets. The noble metals would be too costly, the baser would corrode; and with either the value of the plates as metal would be a standing danger to the deposit. The material basis of the library must be, as nearly as possible, worthless for other uses (to insure them against the natural greed of man), yet such as will hold the records sharply and faithfully under all circumstances. The *terra cotta* tablets of ancient Assyria are instructive in this connection. Possibly plates of artificial stone, or sheets of a *papier-maché*-like preparation of asbestos, might be less bulky and equally durable.

Having determined this point, and dug from the solid rock a chamber for the reception of our legacy, the next step would be the selection of its contents. Obviously the books to be preserved should embrace first of all lexicons and grammars of every known form of speech, since it is impossible to tell which of the dialects of to-day will be the parents of the dominant tongue of any distant future time; while we may be practically certain that some one or more of the languages of to-day will furnish a key to any language that men will ever use. Next in order would come encyclopædias, the most comprehensive and complete that there might be room for. The sacred books of all nations might come next; then the works of the great poets, historians and novelists; after them, the best obtainable records of art, science, the various industries, and so on, with specimens of the best and most typical of our works of art, manufacture, and the like.

The spaces between the various articles should be filled in with some insoluble and neutral substance, to prevent corrosion, or the infiltration of water and consequent damage to the plates. Then, the entrance to the chamber being securely sealed, permanent records should be made in many places and in various ways, setting forth the purpose of the deposit, its exact location, and the nature of its contents. Among such records not the least valuable would be deeply cut polyglot inscriptions on natural cliffs in different parts of the world, observation having shown that such records may remain to challenge human curiosity for ages after all other records of their time have disappeared.

Even a single deposit of this sort might prove of enormous value to the race at some critical period of its history. But the probability is that the good work would not end with one deposit. From age to age this and other nations might repeat the experiment, commemorating in this way important epochs in their history. The fashion once set might easily become a permanent feature of all great national celebrations. The cost would be comparatively small: a penny contribution from each of the visitors to the Philadelphia Exhibition, for example, would have been quite sufficient to provide for a memorial of our first Centennial year that would have carried an imperishable picture of the civilization of the day to the end of—our first millennium, at least; and we may safely infer that, whatever may be the condition of the world at that not very remote epoch, a memorial of that sort would be something worth having.

As we have intimated, the custom might easily become

general, so that in the course of ages the earth would become dotted with such repositories of art and learning. Then, come what might to humanity—whatever might be the ups and downs of nations—whatever moral, social, or intellectual advances mankind might make—whatever lapses or disasters might befall them—it could hardly happen that a knowledge of any considerable period of human history, or the advantage of any worthy human achievement, could ever be permanently blotted out and lost.

It is true that "posterity" has never done anything of the sort for us. It is true that "posterity" may have no valid claim on us for such a legacy. But we might venture to make "posterity" a present! It would not cost us much, and it might turn out to be immensely valuable and useful to some far future age.

THE LOST ARTS IN NEW YORK.

While the objects of ancient art contained in the Castellani collection, recently placed on exhibition in the Metropolitan Museum of Art in this city, are individually of great rarity and archæological value, they derive additional importance from the fact that, viewed conjunctively as a collection, they represent connected histories of two great industrial arts extending over many centuries. Both in the work of the goldsmith and of the potter, we are enabled to trace progress from the earliest stages up to a period when the greatest skill was attained, and even subsequently into the era of decadence. In both industries, we find that ancient and mediæval workmen possessed knowledge which we do not possess; and among Signor Castellani's treasures may be seen handiwork which is the embodiment of two lost arts, the secrets of which the modern world, with all its infinitely superior wisdom, has not yet rediscovered.

The productions, in the Castellani collection, of precious metal workers dating from prehistoric epochs, the exact dates of which are wholly unknown, and covering the long period ending in the thirteenth century, are represented by the contents of some twenty cases. The first three of these receptacles bear no dates. The ornaments which they contain are of bronze, amber, silver, and glass (the latter having become converted into opalescent silicic acid), and were found in Prænestе (modern Palestrina, Italy), and in the territory which was ancient Etruria. Case No. 4 bears date 700 B.C., and here is a rich treasure of primitive Etruscan and Phœnician ornaments of gold, adorned with granulated work. Signor Castellani considers that the workmanship of these objects is so perfect that it is impossible at the present time to explain the process of execution, and very difficult to imitate it. The ornaments are of two kinds—those for ordinary use and those for funereal purposes. The first are massive, and might be worn for years without injury; the others are extremely delicate. All are made of the purest gold, and their decoration evinces the most consummate skill and taste on the part of the artist. There is, for example, a small flask, shaped something like an antique wine jar, and about five inches in height. It is of beaten gold, and is covered with a pattern intended to imitate the similarly shaped designs of variegated glass of the Græco-Phœnician period. This pattern is entirely produced by minute globules of metal soldered to the surface in tiers of zigzag or vandyke patterns. Another specimen is a strip of gold covered with granulated lines and bearing a row of birds in relief. On other ornaments are exquisitely carved heads and flowers, produced apparently by hammering on the reverse of the object, but with a delicacy and precision of touch which is simply marvelous.

The closest students of this ancient handiwork are entirely at a loss to understand how the processes of melting, soldering, and wire drawing, which were employed in the art, were performed. Modern workmen have failed in their attempts exactly to imitate the old ornaments; and it is certain that the secret of the mechanical agents, whereby it was possible to separate and join pieces of gold hardly perceptible to the naked eye, is lost. Signor Castellani has taken great pains to solve the problem, reading all the treatises of mediæval goldsmiths, inquiring of all classes of Italian jewelers, and experimenting with all kinds of chemicals, in the hope of finding the solder wherewith the minute grains were attached to the surface of the metal. At last he found some of the old processes still employed in a remote district, hidden in the recesses of the Apennines, far from the great towns. Bringing away a few workmen, he gave them much more instruction, and at last succeeded, not perhaps in equalling, but certainly in rivalling the ancient productions.

We question whether the Etruscans used fire at all in their soldering, as it would be almost an impossibility to keep the excessively fine tools necessary for the work at a proper heat. Mr. Joshua Rose offers the plausible suggestion that a cold flux was employed, with which the workman followed the lines or dots of his pattern. Then the gold granules were possibly sprinkled over the surface, and adhered only to the solder, the superfluous grains being brushed off after the solder had set.

There is also a fragment of a finely woven fabric, made of threads of pure gold, found on the body of a woman in a tomb at Metapontum. This is without doubt the material to which the Psalmist refers in speaking of "the King's daughter" having "clothing of wrought gold;" and in the Pentateuch there is reference to gold threads being used upon looms.

As we follow the various objects in the twenty cases above mentioned, the decline of the goldworker's art when the use of enamels came into vogue is evidenced. Continuing on to later periods, the decadence is more marked under the successors of Alexander. In Rome, under the emperors, we find gold used as a mere setting for precious stones, and finally the collection terminates with examples of workmanship of the time of Charlemagne, when the workmen had lost their cunning, and the noble metal had been altogether debased to secondary uses.

The second instance where a lost art is exemplified in Signor Castellani's collection is in the glazing of the Gubbio majolica. We have not space here to review the magnificent series of ancient specimens of pottery in detail; and thus it will suffice to say that, beginning with some of the earliest pieces made by the Arabs when they occupied Sicily, from the twelfth to the sixteenth century, the collection presents examples of all the finest types of later mediæval art. Gubbio, where the peculiar kind of majolica above noted was made, is a small town once in the territory of the dukes of Urbino; and in the sixteenth century it became famous for its pottery. This was attributable to the talent of one man, Giorgio Andreoli, who is reputed to have invented the wonderful luster characteristic of the Gubbio ware. The body of majolica is mere common clay; and after the piece is finished on the wheel, it is dried and burnt in a furnace. After the biscuit thus prepared has been dipped in the glaze, the colors are applied on the soft surface of the latter, and the vitrifying process fuses all into a glossy enamel of the color of the pigment. This is still the common practice; and we mention it merely to show that to his pigment and glaze Andreoli must have added some third substance, which rendered the enamel capable of reflecting white light as blue, red, green, or yellow light—in other words, of giving the object a luster of a color wholly different from the tints of the pigment. He evidently could produce any desired color at will, and the effects gained are indescribably beautiful. The Castellani collection contains 130 superb specimens, which glow like jewels. In one, the scene of the nativity of Christ is provided with the figures in low relief, and the exquisite cerulean lustre is imparted to give the effect of moonlight. The rarest pieces are those of which the luster is a delicate green. Some blaze with yellow, as if of gold; others exhibit the brilliancy of the ruby; while others resemble the interior of the pearl oyster shell. Whether this sheen is produced by polarization of the light in some manner, or whether it is at all analogous to fluorescence, is yet to be decided. The impression of the surface with fine microscopic lines might produce an iridescence, but not separate and clearly defined hues. The ware was intended for ornamental purposes, not for household use; and it was suspended against the rich, dark tapestries of the period with which walls were covered, thus aiding, as it were, in illuminating the apartment with its exquisite radiance.

THE BLUE GLASS DECEPTION.

On September 26, 1871, General A. J. Pleasonton, of Philadelphia, Pa., obtained a patent for "utilizing the natural light of the sun transmitted through clear glass, and the blue or electric (!) solar rays transmitted through blue, purple, or violet colored glass, or its equivalent, in the propagation and growth of plants and animals." In his specification, of which the above constitutes one claim, he states that he has discovered "special and specific efficacy in the use of this combination of the caloric rays of the sun and the electric blue light in stimulating the glands of the body, the nervous system generally, and the secretive organs of man and animals." He also states that he finds that vegetation is vastly improved by the transmitted blue light.

These alleged re-discoveries—for the General only claims to have devised the method of utilizing them—were extensively promulgated through the press early in 1871. Subsequently, in 1876, General Pleasonton published a book on the subject, the volume being appropriately bound in blue and printed in blue ink. Recently public attention has again been called to the subject by a New York daily journal. The peculiar kind of glass in question is known as "pot metal blue," that is, it is stained a bluish violet throughout, and is not clear glass covered with flashings of blue glass. It is used in greenhouses, etc., in connection with clear glass; and in General Pleasonton's grapery it appears that only every eighth row of panes was blue. Some of the results alleged to have been obtained by exposing animals and plants are as follows: Twenty grape vines, in their second year, after being set out under the blue glass, bore 1,200 lbs. of splendid fruit. A very weak Alderney bull calf was in four months developed into a strong and vigorous bull. Heifers when kept under blue glass may safely bear young when 18 months old. A weak child, weighing but 3½ lbs. at birth, weighed at the end of four months 22 lbs.—the light in this instance having come through blue curtains. Two major-generals with rheumatism were cured in three days. A young lady whose hair had come out regained her tresses; and to these must be added various other cures of severe ailments which we have not space here to recapitulate. The above are the alleged facts; and we propose to consider the supposed discovery in the light of previous investigations.

With reference to the theories of electricity, etc., advanced by General Pleasonton to account for his phenomena, their absurdity is so complete that we shall waste no time over them. The important question in the matter, and the only one in which the public is interested, is whether or not blue glass is capable of producing all or any of the results imputed to its use. In order to clear the way for the examination of the investigations, the records of which we have carefully collected, let us consider first those which General Pleasonton quotes in support of his views. These are (1) Seunebier's researches, which go to show that the blue and violet rays are the most active in determining the decomposition of carbonic acid in plants, and (2) experiments of Dr. Morichini, repeated by Carpa and Ridolfi, proving that violet rays magnetized a small needle. The first statement has been totally disproved. Dr. Von Bezold, in his recent work on color, states that "the chemical processes in plants, as far as they are dependent upon light, are principally caused by the rays of medium and of lower refrangibility. The development of the green color of the chlorophyll, the decomposition of carbonic acid, as well as the formation of starch, etc., in the grains of the chlorophyll, are induced by the red, green, and orange rays." The blue, violet, and ultra violet rays, the same authority goes on to explain, influence "the rapidity of growth, compel the so-called zoöspores to move in certain directions, and alter the positions of leaves, etc. In confirmation of this, we have Sach's experiments in 1872, which show that light, transmitted through the yellow solution of potassium chromate, enables green leaves to decompose over 88 per cent. of carbonic acid; while that passed through blue ammonia copper oxide decomposes less than 8 per cent. This proves the superiority of the yellow ray to decompose carbonic acid; and this fact Professor J. W. Draper discovered a long time ago by the direct use of the spectrum. In still further confirmation, we may cite the investigations of Vogel, Pfeiffer, Selim, and Placentim. The last three have conducted researches in full knowledge of those of General Pleasonton, and their experiments show that yellow rays are more promotive of the evolution of carbon in animals and its absorption in plants than any others in the spectrum, the violet rays having least power in these respects, with the exception of the red rays in the case of animals. The absorption of carbonic acid by plants, and its evolution by animals, we hardly need add, are prime essentials to the growth and health of each. The notion that light possesses a magnetizing power on steel was upset by Niepce de St. Victor in 1861. After removing every source of error, he "found it impossible to make one sewing needle, solarized for a very long time under the rays of light concentrated by a strong lens, attract another suspended by a hair, whether the light was white or colored by being made to pass through a violet-colored glass."

We can proceed further and even show that violet light is in some respects hurtful to plants. Cailletet, for example, says in 1868 that "light which was passed through a solution of iodine in carbonic disulphide prevents decomposition altogether." Baudrimont says that "no colored light permits vegetables to go through all the phases of their evolutions. Violet-colored light is positively injurious to plants; they absolutely require white light." This scientist instituted the most elaborate experiments on the subject, ranging over 11 years, from 1850 to 1861; and the result of all his labor may be summed up in the simple statement that no illumination which human ingenuity can devise is so well adapted for promoting natural processes as the pure white light provided by the Creator. So much by way of general denial of the claims of superior efficacy residing in blue light of any kind.

Now we have yet to examine the peculiar variety of blue light here used. Sunlight can, by means of the prism, be split into colored rays, any one of which we may isolate, and so obtain a certain colored light. Similarly we may obtain light of a desired color by the use of a colored glass which will stop out the rays not of the hue required. So that we may obtain violet light from the spectrum or by filtering sunlight through violet glass. When, however, Dr. Von Bezold, as above, asserts that the violet rays have such and such an effect, he means the violet of the spectrum, which has its specific duty to perform in the compound light of which it is a necessary portion. But the violet light of the spectrum and filtered violet sunlight are altogether different things. The first, as our valued contributor Dr. Van der Weyde has very clearly pointed out, is "a homogeneous color containing, besides the luminous, the invisible chemical rays without any caloric rays; while the light colored by passing through violet glass is a mixture of blue rays with the red rays at the other end of the spectrum; and it contains a quantity of the chemical rays belonging to the blue and the caloric rays belonging to the red. In fact, violet glass passes a light identical with sunlight, only much reduced in power, containing but a portion of its caloric, chemical, and luminous agency: being simply deprived of its strongest rays." And this the spectroscope has clearly demonstrated. Reduced to its simplest terms, then, the necessary conclusion is that the violet glass acts purely as a shade for decreasing the intensity of the solar light. And in the simple fact that it does so serve as a shade lies the sole virtue (if any there be) of the glass. In 1856, Dr. Daubeny made experiments on the germination of seeds, and in his report is this suggestive sentence: "In a south aspect, indeed, light which had passed through the ammonia sulphate of copper (blue solution), and even darkness itself, seemed more favorable than the whole of the spectrum; but this law did not seem to extend to the case of seeds placed in a northern aspect where the total amount of light was less considerable."

In our next issue, we shall review the effects of light and darkness upon the animal organization, and endeavor to account for the curing of diseases and the production of other phenomena which have been erroneously ascribed to the influence of the blue filtered sunlight.