

spacious room in which engines and boilers are located. The engines, two in number and of forty horse power each, are horizontal, and are connected directly to pinions which engage in large spur wheels arranged between the two winding drums. The latter are 12 feet in diameter, and to each are brought two 1 1/4 inch steel wire ropes, which serve to hoist and lower the trucks. Inside the engineer's house above are counterpoised levers connecting with the throttle and link, and a treadle operated by the foot, which governs friction and vacuum brakes on the drums. The average time of raising one car, while lowering another, is one minute, though the same can be done with safety in half that interval. The work was begun on July 1, and finished in November 21, 1874. Mr. John P. Endries is the designing engineer, and the Dickson Manufacturing Company, of Scranton, Pa., the builders. The total cost was \$80,000. We understand that it is proposed to construct another and similar elevator further to the north, at a point where the ridge is 230 feet high.

The new distributing reservoir, now in process of construction under the supervision of Mr. J. P. Culver, Chief Engineer of the Jersey City Water Works, is located on the summit of the hill and between the positions of the elevator and the Delaware, Lackawanna, and Western tunnel. For many years past the Bergen reservoir, a small structure holding only a three or four days' supply for the city, has served the purpose of a distributor; but the increasing population has necessitated the present building, of larger accommodations. Work was commenced on the new reservoir in 1870, and will, it is expected, be completed so that a portion of the reservoir can be used during the coming fall. The area of the structure is 27 acres, or 700 feet wide by 1,700 feet long. Its capacity will be 23,000,000 gallons, this being a supply for 23 days. The depth of water will be 25 feet. The receptacle is divided into two portions, either or both of which may be drawn upon at will, and is surrounded by a heavy stone wall and puddle bank, the former 18 feet in height. The cost, up to the present time, is said to be half a million dollars. The means of supplying this reservoir consists in a huge siphon 30,075 feet long, which joins it with the reservoir at Belleville. The siphon has a fall of 29 feet, and is composed of three separate pipes resting upon a trestlework bed, which is constructed over the meadows. The oldest pipe is twenty inches, and the others, which have been placed quite recently, are thirty-six inches, in diameter. One of the latter is of cast iron; the other is worthy of special remark, as it is made of one eighth inch boiler iron, riveted together and covered inside and out with two inches of hydraulic cement.

It is interesting, by way of conclusion, to sum up the aggregate amount which has been spent in overcoming the rocky obstacle which Nature has placed at the very threshold of the metropolis, and through, over, or under which lies the most direct line from the West and South to the great market. The open cuts we placed at one million, the Bergen tunnel another million, the Delaware, Lackawanna, and Western tunnel eight hundred thousand, and the car elevator eighty thousand dollars; total, two millions eight hundred and eighty thousand dollars, or, including the second car elevator, in round numbers three millions of dollars.

SCIENTIFIC AND PRACTICAL INFORMATION.

HETEROPLASTY, A NEW MEDICAL DISCOVERY.

Skin grafting, as we have taken occasion to explain in some detail, is the removal of a piece of skin from the sound part of the body of the patient, or from another individual, and placing the same upon the raw surface of an obstinate ulcer, burn, or other wound. By thus creating centers of eccentric cicatrization on extensively injured surfaces, the rapidity of the healing process can be much accelerated.

Dr. R. J. Levis, in an extended article on this topic which we transferred to our columns some months ago, alluded to the possibility of obtaining the necessary grafts from limbs amputated for traumatic injuries. This has been repeatedly tried by Dr. Anger, of Paris, and with such remarkable success that the result is considered as certain as if grafts directly obtained from the patient were employed. Dr. Anger, however, proceeds further, and has used, not merely epidermic grafts, but those comprising much thicker layers—dermo-epidermic, he terms them—and finally he is enabled to employ the entire thickness of the skin, and even the subcutaneous cellular tissue. He has successfully transplanted grafts of the last description from 0.3 to 0.6 inch in diameter, obtained from the palmar face of an amputated finger. These were applied to an open ulcer on the leg of the patient and bound in place by diachylon bandages. Three days after the grafts were intimately united with the injured surface and manifestly vascularized. Heteroplasty is the new name given to the operation.

THE CHEMICAL CONSTITUTION OF THE BRAIN.

M. Gobley has recently completed extended investigations on the above subject, from which we adduce the following results: The human cerebral substance contains about 80 per cent of water. Two albuminoid matters are present, one not differing from albumen and soluble in water; the other is insoluble, and for this the investigator proposes the name of "cephaline." The fatty substance of the brain is formed principally of cholesterin, lecithin, and cerebrin, and also olein and margaric. The organ contains certain salts, some soluble in water and in alcohol, others soluble in water and not in alcohol. During decomposition, the cerebral pulp furnishes acid products, among which are oleic, margaric, phospho-glyceric and phosphoric acids.

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THE GENERATION OF THE WICKED.

It is a fortunate circumstance that vice is ultimately self-destructive. Lust, violence, and debauchery are killing in themselves; and the children of the brutally vicious are very apt to enter upon the struggle for existence weighted with such an inheritance of weakness and disease that their early extinction is all but inevitable. It is a law of nature that the generation of the wicked shall be cut off.

To this beneficent law, however, there are serious exceptions. Certain phases of criminality—as may be seen any morning in our police courts—are not only consistent with but are usually accompanied by abundant animal vigor, capable of indefinite propagation; and the probabilities are that the criminals of future years will be chiefly descended from the sturdy sinners for whose restraint the police systems of to-day are mainly required. The criminal class, like the pauper class, is to a great extent an hereditary caste, representing the uncivilized and largely uncivilizable elements of the community. How to deal with this class, how to turn its perverted forces into useful channels, and make its perpetuation difficult if not impossible, is the great social problem of the day.

Victor Hugo has said that the quickest way to civilize a man is to civilize his grandmother. The saying is worthy of a place among the axioms of social science. Certainly when society neglects the grandmother—as it did in the case of the waif called "Maggie" (referred to in our paper of January 9), to whom Dr. Harris traces such a pestilent brood of human vipers—the succeeding generations are pretty sure to pay a heavy penalty in perpetuated savagery. Probably each one of the small army of criminals, lunatics, drunkards, imbeciles, and the rest, to which she gave being, has cost the country more than would have sufficed for the reclamation of a dozen such grandmothers to be, certainly enough to surround them with conditions which would make it impossible for any one of them to stock a country with criminals and paupers.

It will not take many such cases, it is to be hoped, to rouse the community to an appreciation of the urgent need of greater watchfulness in regard to the development of vagrant children, and all children not subject to wholesome influences. Who can say how many Maggies are skulking about city and country to-day, or cowering in homes of bru-

tality and vice, receiving the training requisite for making them criminals and breeders of criminals? For its own safety, let alone the children's present and future welfare, society is bound to adopt more liberal and thorough measures for removing such heirs of crime and criminal poverty from their corrupting environment, and for training them in ways of industry and morality.

It may be impossible to make much of such unpromising material, nevertheless it is possible to prevent much; and with social as well as with individual disease, prevention is better than cure. Every boy or girl growing up in beggary and lawlessness is the possible ancestor of a line of pariahs as numerous and burdensome as Maggie's have been; and neither prudence nor philanthropy can tolerate the neglect of them. As a matter of justice, too, society has as little right to allow the future to be afflicted with the pernicious fruit of such pernicious stems as it has to stock the fields with poisonous plants, or knowingly to establish the conditions for the development of future pestilences.

How Can Society Help Itself?

Primarily, by civilizing, so far as possible, the naturally uncivilized grandmothers, not forgetting the grandfathers also, by bringing them up in habits of honest industry in useful occupations: not in unnatural masses in prison-like asylums, but in workshops and families. This done rigorously, the criminal class will be largely cut off by conversion into something better. We shall have cause for thankfulness when so much is done. But the time is probably coming when society will see the necessity of taking still more radical measures for the prevention, not only of possible crime, but of possible criminals. In a more immediate and active sense than the words now carry, the generation of the wicked will be cut off.

Nature's processes for effecting this end are, like most other natural processes, very slow and very wasteful; still more, they are very unjust, since the innocent suffer far more than the guilty. The lusty vagabond leads a jolly life, filled to the end with all the enjoyment he is capable of; and leaves behind him a numerous progeny to pay the penalty of his misdeeds in hereditary poverty, impoverished constitutions, depraved tastes, wasting diseases, and other conditions of early defeat in life's engagements, and the morally and physically healthy are taxed for the support of almshouses, prisons, asylums, hospitals, and other places of refuge for them. For the victims, as well as for humanity at large, it were better had they never been born. We do well to make the most of them after they are born—or rather, we should do well did we do so; but would it not be infinitely better all round could their existence be made impossible from the outset?

Advantages of a Diminished Birth Rate.

The rational tendency of high civilization is toward a diminished birth rate. The waste of life that goes on in ruder societies, through wars public and private, through improvidence and unhealthy conditions of living, is immensely lessened in civilized communities, and with it the need of many births. A vastly larger proportion of the children born are able to attain maturity, and the average duration of life is much increased. A low birth rate is therefore perfectly consistent with high national power and progress, and the development of all that makes life desirable; and, as we have said, the tendency of civilization is always to attain such an economical birth rate.

But unfortunately, while the law holds good in the upper grades of civilized society, the lower and more or less uncivilized grades are under no such moral restraint. Improvident in all things, they are equally so in human life. Careless of the responsibilities of parentage, they breed like vermin; and since society throws around their offspring so far as possible all the sanitary conditions and advantages of civilization, the descendants of the lower half of any community are pretty sure to preponderate numerically. The criminal grades are especially prolific, more than enough so to make up for the destructive influences of crime. The effect upon the future well being of society can scarcely be other than disastrous, unless special effort is made to counteract the evil by preventive as well as by curative means.

The Knife Remedy.

We can only regard it as an illustration of the power of popular prejudice that people, who find nothing to condemn in the extermination of individuals whose murderous nature seems incompatible with public safety, are ready to hold up their hands in horror at the most guarded suggestion of the advisability of making it impossible for lusty savages to inflict upon the community a brood of ill balanced organisms, destined to swell the ranks of vice and crime. Yet society may be driven to adopt just such radical measures in self-defense, driven to make sterility one of the penalties for the grosser forms of criminality.

The effect on the criminal statistics of this city for the next hundred years would be something marvelous, we fancy, were the worst offenders against public peace and morality sent to the island—not as now to recuperate their wasted forces and return in a few weeks to enter more lustily than ever upon their evil courses—but to be made perfectly harmless as regards the future. In this way only, can the stream of tendency which makes for unrighteousness be dried up at its source.

It has been objected that the subjects would be spoiled as human workers, through loss of ambition and energy; but the objection scarcely holds in view of the fact that their representatives in the East have from the earliest times been prized for their serviceableness. Besides, they are of little worth as workers as they are, and the change would rather tend to diminish their rampant beastliness and make them more amenable to civilization. Many an unmanageable