

a scar. In like manner a severed finger may be made to grow together again, and an amputated nose built up in form with live flesh from the cheek.

In such cases muscular fibers as well as skin are restored or reunited by internal growth. This may be observed also wherever a deep cut is healed. It has been found, too, that the muscular tissues which perform involuntary motions in the interior of the body possess the same power of self-restoration. It is this recuperative faculty which enables the cattle of Abyssinia to supply their barbarous owners with steaks without losing their lives. The hungry savage throws his ox upon the ground, makes a cross cut in the skin of the flank, lifts the skin and cuts out a chunk of beef for his dinner, replaces the skin, and drives on rejoicing, trusting to internal growth to restore the mutilated part to health and soundness.

In every wound of the skin or muscle, nerves are severed. The restoration of the functions of feeling and motion, with the progressive healing of the wound, shows that the nerves are likewise capable of reparation. The renewal of nerve connection has been watched in cases, where, as is sometimes necessary, a section of a large nerve has been cut out. In a couple of months after the nerve is cut, a gray lump appears on one extremity of the severed nerve. Growth proceeds towards the opposite nerve end until a new connection is made, at first more slender than the original; but by degrees the nerve elements increase in size and whiteness, until, in from four to six months, the nervous cord is fully restored. This process, it is said, goes on even when two inches of nerve has been excised.

About a dozen years ago it was demonstrated that cartilage, formerly supposed to be incapable of renovation, was also subject to the same laws. The cartilaginous tissue of dogs and rabbits was divided, and at the end of two months was found to be completely restored. Similarly the tendons by which muscles are attached to bones are able to reunite when severed or torn out: a fortunate circumstance for a prominent clergyman of this city, whose *tendo Achillis* was suddenly snapped while walking along the street one day last winter, thus making his foot temporarily useless. Thanks however, to the gradual reunion of the tendon, the crippled limb will in time be restored to usefulness.

Still more remarkable is the restoration of bones, and even the development of bones in abnormal positions by the transplanting of the periosteum, the membrane surrounding bony structures and the principal agent in elaborating them. Formerly, in case of a badly shattered or diseased bone, the amputation of the limb was the only resource. Now the skillful surgeon excavates the damaged parts; and in a few months the limb, which has never lost its form, repairs its losses, and regains its strength. Attempts have also been made to graft healthy bones in place of diseased ones, but they have fallen short of perfect success. The transplanting of teeth has been more successful, and partial success has attended the reproduction of teeth by a sort of budding process. In its natural development, a tooth springs from a little bay or follicle, containing an organ or germ for the production of the ivory of the tooth and one for the enamel. The entire follicle taken from a puppy and grafted into the jaw of an adult dog continues its development, and a perfect tooth is the result. Doubtless the same would occur in human jaws, and possibly the dentist of the future will be prepared to set the germ of a new tooth in the place of each one he extracts, giving the patient a choice of the whole range of mammalian dentition!

Among the curiosities of this sort of surgery, we may mention the trumpet-nosed rats with which a waggish student puzzled the naturalists of Paris. By grafting the tip of one rat's tail into the snout of another rat, he produced a nondescript creature with a trumpet-shaped proboscis, for which it had no use; yet the connection of the nerves and blood vessels was complete, and the sensibility of the part so keen as to preclude the idea of mechanical attachment. Similarly cock's combs have been furnished with teeth and spurs by transplanting.

THE RECENT REMARKABLE PROGRESS IN THE STEEL INDUSTRY.

We are inclined to believe that very few of our readers have any idea of the immense progress which has been made in the steel industry in this section of the country during the past few months. When we state that American pig has been obtained as low as \$32 per ton, from which the rails produced included but one per cent of second quality, as against imported pig at \$65 per ton, which yielded from ten to twelve per cent of second quality rails, eighteen months ago, we need hardly point out that competition, under these conditions, is out of the question, and that the foreign metal in our markets bids fair to lose whatever footing it may still possess. Add to the above that, with the exception of such as has been necessary to complete old contracts, no English rails have been imported into this country for some nine months, and that the importation has without doubt ceased for ever, that the Grand Trunk Railway of Canada, whose president and many of whose directors are heavy stockholders in the great Barrow plant, have found it to their interest to order 6,500 tons of rails from the works in Troy, N. Y., rather than send to England, and that 120,000 tons of ore, from which steel can be at once produced, with anthracite coal and without admixture of other ores, can be annually mined at the Crown Point mine in this State; and perhaps we have adduced sufficient instances to bear us out in the view that the steel production of this country is rapidly advancing toward a point of close competition with that of Great Britain.

It is well to bear in mind that the extraordinary strides

which we have indicated have mainly taken place since the exploitation of the Crown Point mine, near Lake Champlain, in New York State, and have been aided by the consolidation of the two great iron-making establishments of Troy, formerly under the control of Messrs. Erastus Corning and John A. Griswold, into one great corporation, now known as the Albany and Rensselaer Iron and Steel Company. The ore of the mine above mentioned is of singular purity, and so well adapted for steel making that it finds a market in the heart of the Pennsylvania iron district, no less than 40,000 tons being sent thither during the present year. The Port Henry product yields seventy per cent in the furnace, and the deposit is seemingly inexhaustible. The ore, however, is not capable of being smelted into steel. There is a single wall, 225 feet high by 300 feet face, of ore, while the roof is supported by pillars of ore, each containing from sixty to seventy-five thousand tons. Upwards of \$2,000,000, we are informed, have been spent in developing these resources.

The consolidated works above mentioned use up about 100,000 tons of pig metal yearly, and can produce about 24,000 tons of the same from their own furnaces. Their coal expenditure is in the neighborhood of 150,000 tons.

The melting of pig for conversion is about 300 tons per day, and the product of steel rails 1,100 tons, or two and a half miles, per week, two five ton converters literally turning out as many ingots in weight as is accomplished in Barrow with seven converters of like size. The metal is cast in ingots weighing a ton each, and from the time it leaves the cupola it never stops until it results in a finished bloom. Hammers are abolished and rolls substituted, and herein lies one of the important causes of the reduced cost and improved quality of the product. The latter is, by the drawing in lieu of the pounding process, rendered far more homogeneous and far more uniform throughout; while the celerity of the operation, due to the novel machinery which has been introduced, is certainly most remarkable. Each ingot makes three rails, and the bar, which on entering the rolls is thirteen inches square, is reduced to six inches in a single heat. The time occupied by the steel in changing from the bloom to a finished rail is one minute and thirty seconds. It is impossible, within the limits of this article, to describe the tables on which the metal is lifted, or the automatic fingers which turn it to present it to the rolls, or, indeed, any of the ingenious mechanism which reduces the labor of eighteen men to that of one man and a boy, and handles the great masses as if they were feathers. This we reserve for a future time, when the pencil of the artist can aid our explanation, and when we shall be enabled to tell how ingots weighing two tons instead of one are as deftly manipulated. The cost of making the pig is about \$32 per ton, and from this steel, worth \$75, a sum which allows the manufacturer a fair profit, comes in competition with the English production, for which \$95 is demanded on this side of the water.

The facts which we have mentioned will appear to many incomprehensible when the unsettled condition of labor in Troy for some time past is recalled. This state of affairs certainly renders the circumstances all the more remarkable, for that which has been done has been accomplished in the face of strikes, and during the prevalence of trade union intimidation, when reliable workmen were few and far between. In all the great works above mentioned, not a union man is employed. Abnegation of trade societies is a rigid condition upon those hired. As a result, skilled labor has had to be manufactured.

Brains and the green hands did what we have told; skilled labor found itself for once unable to overcome its employers as it did in Pittsburgh, and skilled labor, in the persons of the trades unions, went to the wall. Meanwhile the day laborers, the carpenters, the bakers, and who not, collected in the great plant, have, under the direction of enterprising capital, brought forth from its furnaces a production twenty per cent greater than ever before. Still better and greater, they have been the means of demonstrating to the nation that the days when the ships that float our commerce, when the mechanism which represents the highest of our inventive skill, and when the arms which protect us against our enemies, are but sources of profit to foreign hands are soon to be numbered with those for ever past.

The enterprise which has so successfully developed these resources, and the executive skill which has organized and governed the labor of this great undertaking, exhibit a power not only to emancipate the country from a foreign product, but also to free labor from the despotism of the trades unions.

CIMEX LECTULARIUS.

A correspondent, who states that he has perused with much gratification our recent article on the "Mission of the Fly," based upon Mr. Emerson's ingenious researches, sends us a pathetic epistle, in which in a few poetic, almost Miltonic, phrases he depicts dire nocturnal anguish; and then, lapsing into gross utilitarianism, he demands if we know any use for the bedbug. There is a vein of subtle sarcasm, we fear, underlying the request of our correspondent, or else he would not have made it; for the utility of that odoriferous insect as a stimulator to the invention of new explosives and of patent vermin eradicators is certainly unquestioned.

Still, and seriously, the writer seems to have unwittingly wandered into that same error in which nine out of ten of those whose motto is *cui bono* find themselves involved. It is an entire mistake to suppose the human race of such overweening importance in the scheme of creation that everything else is made for its benefit only. All things animate

and inanimate are undoubtedly created for some wise purpose, but that such is always to enure to the advantage of man by no means follows. There have been periods in the earth's history when nothing on the globe was of the slightest human utility: man could not even exist. Again, still later, the earth, though inhabited by living beings, was unfit for humanity, for the creatures which then flourished would speedily have exterminated it. Because, then, the human race now dwells and multiplies upon the globe, there is no reason to suppose that its enemies have utterly disappeared, any more than there is to warrant a like supposition regarding things hostile to any other living creature. That the number of enemies of man is constantly decreasing is true, and that some time they may altogether disappear is not without the bounds of imagination; but it nevertheless is just as plausible to believe that the great cave bears and other gigantic brutes which peopled the earth at man's advent did not attack him a whit less fiercely than *cimex* does now. In fact, we have no doubt that some troglodyte in the recesses of his cavern, or lake dweller perched on his pile-supported lacustrine habitation, has wondered of what earthly use cave bears, and wolves, and hyenas, and gigantic saurians were, with as much fervor as any modern individual has vexed his brain with the same thought after a night's combat with the minute pests.

Clearly, then, the attempted destruction of ourselves by the bugs is only one link in the chain which pervades all animated nature, and therefore it is with equal plausibility that it may be asked: of what use are we to the bedbug? as of what use the bedbug is to us. Our correspondent who describes the effect of the ravages of *cimex* so graphically certainly will require no answer to the former question.

We know nothing good of the bedbug; he has never found, so far as we can learn, but two defenders: one, an insane Englishman who made a pet of him, and left, on dying, to his disgusted heirs, a room swarming at every point; the other, a Banian hospital at Surat, India, in which a ward was devoted entirely to vermin, as other wards were to various kinds of animals. Forbes, in his "Oriental Memoirs," says: "The overseers of the hospital frequently hired beggars from the streets, for a stipulated sum, to pass a night with the fleas, lice, and bugs, on the express condition of suffering them to enjoy their feast without molestation."

It is said that bedbugs did not appear in England until after the great fire in London in 1666, and then they arrived in the wood imported from America for rebuilding the city. It is hardly necessary for us to suggest that the bedbug, being indigenous to our soil, offers a grand opportunity for the display of another great national resource at the Centennial. Specimens of *cimicidæ*, as reared in different States, and perhaps a working model of a boarding-house bedstead, in which might be displayed the entire mode of raising the insects, would be of deep and lasting interest to foreign visitors. The fact of Pliny mentioning the bug several hundred years earlier than the time of the English writer, however, rather throws a doubt upon the assertions of the latter as to the origin of *cimex*. A variety of them certainly does infest pine woods—*ergo*, beware of pine furniture—and has been frequently found in the great forests of Sweden, and hence it is probable that in the pine lumber carried across the Atlantic whole colonies of the pest existed, which merely added to the stock already accumulated in Britain.

It is a curious fact that, in an old edition of the Scriptures known as Matthew's Bible, published in the middle of the last century, the passage translated in our modern version "thou shalt not be afraid of the terror by night" is rendered "thou shalt not nede be afraid of any bugs by night": a plausible translation in times when houses were so infested that two noblemen, after an attempt at rest in an inn, "were grievously frightened the next morning and sent for a leech, lest they were stricken with the plague."

Cimex, among other peculiar traits, hates horses and wages desperate war on fleas. He will not attack fowls, but will swallow and bats. Goeze has kept him six years without food, and he has withstood a temperature of 5° below zero, Fah., without injury. The female deposits 250 eggs at a time, which require three weeks to hatch. Against these there is practically no remedy save mercury: heat, cold, moisture, and dryness being alike destitute of effect. The insect is possessed of keen sight and of an exquisite sense of smell, by the latter of which, and not (as popularly supposed) by the sensation of heat, it is guided to its prey.

The arch enemy of the bedbug is the *reduvius personatus*, a bug which rolls itself into a ball, covers itself with dirt, and then lies motionless in wait, pouncing on the unsuspecting *cimex* the moment the latter comes within reach, and sucking its carcass dry. The objection to training and rearing the *reduvius*, as a hunter of bedbugs, is that it bites the human race with much more spite than it does its natural prey.

Finally, the use of *cimex lectularius*—if he have any, beneficial to man—is simply to preach cleanliness; for where that is maintained, he finds no resting place.

Robert Hardwicke, F.L.S.

Mr. Robert Hardwicke, founder and publisher of *Science Gossip*, a very excellent English periodical, devoted mainly to entomology, zoology, and botany, recently died of paralysis. Mr. Hardwicke is well known on both sides of the Atlantic as a zealous promoter of the cause of Science, which he has materially aided by the publication of its literature in cheap and popular form. He was an earnest advocate of the study of Nature as the greatest of all text books; and the main object of the journal, to which he devoted his best endeavors, was to inculcate like ideas among all students of Nature's works.