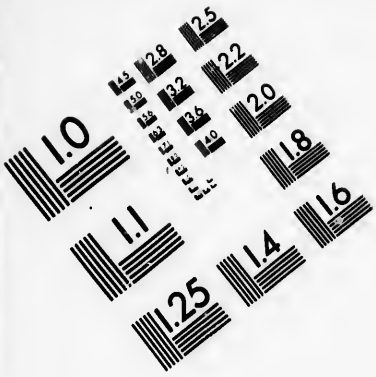

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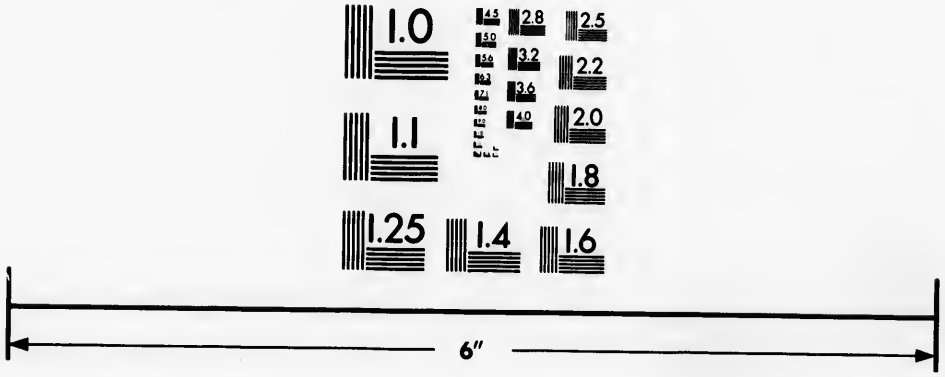

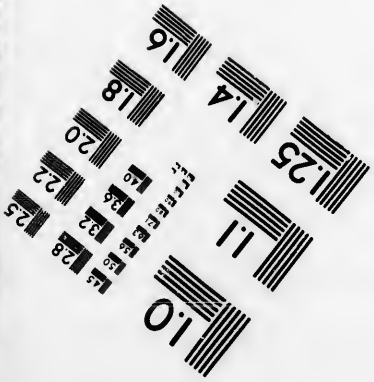

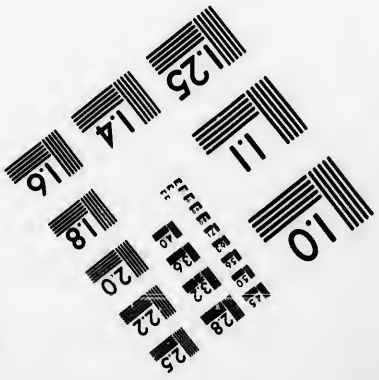

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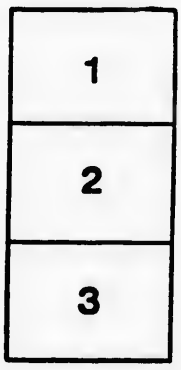

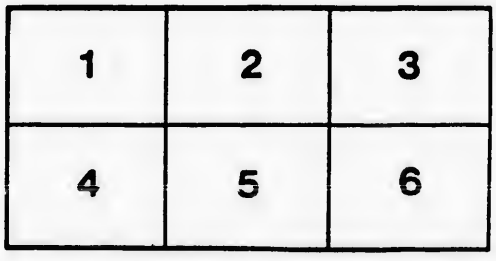

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SPECIMENS OF PRESS NOTICES.

(Hamilton Spectator, May 6, 1894.)

"THE SCOTCH LEAD THE WORLD."

"Rev. W. J. Mackenzie, Canon of Christ's Church Cathedral and Rector of Chippawa lectured last night in the basement of St. Peter's Church on the subject of Scotland and her share in the civilization of the world. In spite of the heavy rain the reverend gentleman had a fair audience, and it was a very appreciative one. Bishop Hamilton occupied the chair.

"Canon Mackenzie held a brief for Scotland and Scotchmen. When he had finished the audience were left in a state of uncertainty as to whether anything worth doing had ever been done in the world by any one who was not a Scotchman. The reverend lecturer showed and backed up every claim with authorities—that almost all the modern inventions in machinery and applied science which have revolutionized the industrial world, annihilated distance, and done so much to advance civilization, are products of Scotch genius. Among these are the steam-engine, the locomotive, the steamship, the balloon, the application of electricity to human uses, the discovery of chloroform, the invention of cradling machinery for cutting grain, the reaping machine, and many more. He also dwelt eloquently upon the prowess of Scotch upon the field of battle, and showed what immense service they had done in extending and maintaining the empire. The names of eminent British statesmen were mentioned, and a surprising number of the greatest of them were those of men born north of the Tweed. The contributions of Scotchmen to the philosophy, history, art, and commerce of the world was also touched upon. Canon Mackenzie claimed that in the field of lyric poetry the Scotch stood pre-eminent among the nations of the earth. He had with him a large number of specimen songs, but did not read them because it was ten o'clock before he had reached that phase of his subject. The lecture was not only full of interesting facts, but was also made enter-

taining by a continuous play of wit and many touches of sly humour. Canon Mackenzie made out a great case for his country.

"In conveying the thanks of the audience to the reverend gentleman Bishop Hamilton remarked that to judge from the lecture it was evident that the Scotch had done well by the world, and Canon Mackenzie had done well by the Scotch."

(Niagara Falls Record, April 16, 1896.)

"An open meeting of the local camp of the Sons of Scotland was held on Friday evening last for the purpose of listening to a lecture by the Rev. Canon Mackenzie, of Chippawa, on 'Scotland and her share in enlightening and civilizing the world.' Those who braved the elements on that stormy evening were amply repaid for their hardihood in so doing for the reverend gentleman's exhaustive lecture proved a treat indeed, and was equally enjoyed by the Sons of Scotland and those friends who had been invited to be present.

"In his introductory remarks he reminded his hearers that he did not wish to claim everything for Scotchmen, as in his lecture on England and Ireland he had done ample justice to those nationalities, in fact, had been almost accused of 'claiming everything in sight' for them.

"The Canon's description of the emblems of Scotland—the Unicorn and Thistle—and his application of their peculiarities to the national character was very beautiful. The lecturer's allusion to the foremost place taken by Scotchmen in science, arts, literature, war, in fact in every walk of life, was highly complimentary to national character for intelligence, shrewdness, indomitable pluck, and hard-headed perseverance. The whole lecture evinced an immense amount of research; every statement was backed by incontrovertable evidence. At the conclusion a hearty vote of thanks was proffered to Rev. Mr. Mackenzie for his very instructive lecture, and a unanimous wish that the lecture might be printed, as it was considered that it would be a valuable addition to Scottish literature."

SCOTLAND'S SHARE

IN CIVILIZING THE WORLD

BY

Rev. Canon Mackenzie

I mind it weel in early date,
When I was beardless, young, and blate,
E'en then a wish—I mind its power—
A wish that to my latest hour
Shall strongly heave my breast,
That I, for puir auld Scotland's sake,
Some usefu' plan or book could make,
Or sing a sang at least.

—*Burns.*

Chicago : New York : Toronto
Fleming H. Revell Company
1899

PREFACE.

This lecture was not originally intended for the press, much less for a book. It was intended merely for an ephemeral "rough and ready" story of Scotland's contributions to the world's welfare, and to be told at a Scottish society's evening entertainment. As years have passed since it was first told, the story has been gradually lengthening by adding new events up to date, yet retaining its original simple and unadorned style. It has been told to several Scottish Societies—Caledonian, St. Andrew's, Sons of Scotland, and Gaelic—without charge; and numerous requests have been made to have it printed for the honour of Scotland. It is a wonderful story, but its sensationalism or eloquence consists only in stubborn facts, supported by authorities considered to be reliable. It was first delivered before the St. Andrew's Society, Cobourg, Ontario; and lest, from its somewhat ambitious title and corresponding facts, it might seem that I was claiming too much for Scotland, I endeavored to do justice to both Ireland and England, by delineating in the same lecture, their respective national characteristics, and showing the share which each of these nations has had in advancing the world's moral and physical welfare.

Being accustomed, as a preacher, to having a text from which to speak, I selected as my text the British

Coat of Arms—the Harp and Shamrock for Ireland, the Lion and Rose for England, and the Unicorn and Thistle for Scotland; and I found to my surprise that these various national emblems had a wonderful adaptation to express the character, the history, and the influence of the nations they severally represent. But as time passed the one lecture grew into three.

The lecture on Ireland I have read both in public and in private to intelligent and patriotic Irishmen, and have requested them to tell me critically and impartially what they thought of it. Their reply in every instance amounts to this—I have done justice to Ireland.

The lecture on England I have not yet read to Englishmen; but I am positive that a hearing of it might lead to the opinion that I was giving to the Lion of England far more of the good things than the Lion's fair share; or as some witty newspaper man said of my lecture on Scotland, "I claim for England everything in sight." I have given to England due credit for her achievements in the arts of peace and war. I have noted with admiration her poets, and prose writers, her scientists, inventors, painters, architects, sculptors, and her vast industries in iron, steel, and clay; her world-wide commerce, her far-reaching Christian missionary operations, and her innumerable benevolent institutions at home. But great and increasingly great though England's enlightening and civilizing influence be, there are some things which she claims, or seems to claim, which patriotic Scotch folk cannot grant her. What these things are can only be briefly mentioned. We cannot allow her to speak of and virtually claim everything great and

good pertaining to Britain, as if it were merely English. Hence we protest with increasing indignation against her speaking of the English army, the English navy, the English Parliament, the English government, the English flag, the English crown, and of braid Scotland as if it were only a part of England. Who does not know that such talk is contrary to the Articles of Union of the two Kingdoms in 1707, in which it was expressly stipulated that thenceforth England and Scotland united should be known and named Great Britain; and therefore while the Union lasts there can be no such thing in existence as an English army, navy, parliament, crown, or flag. With equal propriety we might speak of the Scotch army, navy, parliament, crown, and flag; which kind of talk would of course be scouted as ridiculous. This lecture is intended to show, that many if not most of the great discoveries in science and inventions in art, resulting in modern civilization, are due to Scottish genius, industry, and perseverance. Such things ought to be called British instead of Scotch, and would be so called were it not so common for the English and other nations to ascribe them simply to England.

Very few people know to what extent the civilized world is indebted to Scotland for all that we include in the term civilization. A glance at the contents and press notices of this publication may afford some idea of Scotland's share in promoting the world's welfare; and that far more can be said to her credit than is usually ascribed to her in Scottish literature, or mentioned in speeches at the anniversary meetings of Scottish societies. As the work was too large to be all given as a public lecture, only about a third of it has been used for that purpose.

CONTENTS.

PICTORIAL ILLUSTRATIONS.

The Unicorn. The Thistle and Motto. Highlanders and General Gordon's Monument. Lord Kelvin. Watt's Model of the Locomotive. The Royal William Steamer. Lord Dundonald. David Nasmyth. Robert Burns. Duke of Argyle. Sir Walter Scott. Thomas Carlyle. Robert Louis Stevenson. Andrew Carnegie. John Knox. Sir John Pender, "The Cable King."

CHAPTER I.

Let us now turn to dear auld Scotland, and find out how she compares with Ireland and England, as well as with other nations, in enlightening and civilizing the world. Scotland's emblems are the Unicorn and the Thistle: in these we may read her character.

THE UNICORN.

The Unicorn! A beautiful creature: but, as rep resented in our national arms, only a creature of

heraldic imagination. It looks like a beautiful blood horse; with three peculiarities,—a spiral, sharp-pointed horn on its forehead; deer's feet; and a mule's tail. He must have been a genius who first designed and sketched this figure, as an emblem of our national character. Look at it! A horse, famous for its sagacity, its patient industry, its versatility in usefulnes, its strength, its terrible courage when roused to self-defence. The horse is naturally a kindly, gentle animal, with a considerable spice of pride about him. He evidently thinks himself, and not without cause, quite superior to other animals of the field. He earns an honest livelihood in many departments of life. He drags a cart or waggon; carries an emperor on his back; rushes into the thickest of the battle in times of war; flies like the wind in a race; walks with the greatest gravity at a funeral; works round and round with patience and perseverance at a gin; and so forth. He has evidently a great capacity for good, practical work. The world is much indebted to him for its prosperity and comfort, and could scarcely get along without him.

It must be evident also that the Unicorn, having so much the nature of the horse, must be decidedly *fond of oats*,—a taste which we can at once recognize as peculiarly Scotch.

But further, the Unicorn has the *deer's foot*. This suggests an ardent love of liberty. It speaks of wild glens and mountains, where freedom is cherished and maintained, and revels unrestrained by the narrow and cruel bounds of human tyranny.

The Unicorn derives its name from that *single, spiral, sharp-pointed horn*, so prominent on its fore-

head. Mark it well; the horn is on his forehead, for this is a peculiarity of the Unicorn. Now, the horn is a well-known Scriptural emblem of power; and the forehead is generally taken as the index of intellect. What then does this part of our national emblem intend to represent? What else but that our national character is distinguished by strength and acuteness of intellect?

The Unicorn, so far as we have yet seen him, is exceedingly pleasing. He has a kindly look; an open countenance; a simple, gentle, persuadable aspect; and you think that you could coax such an amiable creature to obey you in everything. Try him. Cajole him, if you can, to do what he thinks is not right. Impose on him a little: try gentleness: try threatening: try physical force. All fails! You are surprised that a creature so gentle, so amiable in aspect, should be so wilful, so obstinate, so stubborn! You do not perceive that under and behind all this openness, and transparency, and kindliness of nature, *there hangs a tail,—a mule's tail*, which represents something in our national character. And what is it? The true, the genuine Scotch article, is a dogged, *dour*, unbending will to maintain and to do what we consider to be morally right; and that moral dourness nothing can overcome but sound sense or brute force. But perhaps you prefer calling it a lion's rather than a mule's tail. Be it so. Then it is much the same; for it represents a character—"bold as a lion,"—and which is not accustomed to "turn tail" in time of dangerous duty, or in defence of right against might. Remember that Scotland has on her golden shield, her *red lion rampant*, the very

color and attitude of which are quite suggestive of "resistance unto blood." Heb. xii. 4.

The Unicorn has quite a sprightly and sportive look as compared with the ferocious and growling Lion on the other side of the British shield; and in this also we read a characteristic of the Scottish people, both Celtic and Sassenach. It was the jocular Englishman, the Rev. Sidney Smith, who said, that, "It required a surgical operation to get a joke into a Scotchman's head." "Of course he means an *English* joke" was the happy remark of another Englishman Lord Iddesleigh, when, as Lord Rector, he was addressing the professors and students of the University of Edinburgh. Smith, however, long after he had cracked his celebrated joke about us, made another joke of the same kind when paying a visit to Robert Chambers of Edinburgh, himself a dry humorist. Chambers said to him, "You must have seen that the Scotch have a considerable fund of humour." "Oh, by all means," replied Smith, "you are immensely funny people, but you require some operating upon you to let the fun out; and I know of no instrument so effectual for that purpose as the corkscrew." Now that joke was intended as an *amende honorable* for what he had said before, and it contains an admission that the Scotch are, as I think they are, "an immensely funny people." See their mass of literature in prose and poetry! What other nation has so many fun[illegible] songs and other poems, and so many funny stories [illegible]? I cannot understand therefore why a popular author and public lecturer, himself a Scot, should recently be telling his audiences, that, "Scotland is proverbially a sad nation;" and, in effect that

when a Scotchman hears or reads a joke he gravely takes it into his serious consideration, and has to cogitate over it for some time to understand its meaning I protest against such misrepresentation of Scottish intellect and intelligence. There are some jokes which no decent intelligent Scotchman can possibly laugh at,—they are so silly, or profane, or morally impure, that he only treats them with deserved contempt or pity, and says of them, at least, "there's nae fun there." But for a really good joke, no man can better appreciate and relish it than a genuine Scot. Here is what Dr. Talmage says about it:

"There is something about the Scotch character, whether I meet it in New York, or London, or Perth, that thrills me through and through. Perhaps it may be because I have such a strong tide of Scotch blood in my own arteries. Next to my own beloved country give me Scotland for residence and grave. The people are in such downright earnest. There is such a roar in their mirth, like a tempest in 'The Trossachs.'

"Take a Glasgow audience, and a speaker must have his feet well planted on the platform, or he will be overmasted by the sympathy of the populace. They are not ashamed to cry, with their broad palms wiping away the tears, and they make no attempt at suppression of glee. They do not simper, or snicker, or chuckle. Throw a joke into a Scotchman's ear and it rolls down to the centre of his diaphragm and then spreads out both ways, toward the foot and brow, until the emotion becomes volcanic, and from the longest hair on the crown of the head to the tip end of the nail on the big toe there is paroxysm of each-

innation. No half and half about the Scotch character. What he hates, he hates; what he likes, he likes. And he lets you know it right away."

The following, also from an American source, may be considered a rejoinder to Smith and other jokers at Scotch gravity:—

"SHE—What do they mean by the centre of gravity?

HE—Tell a joke to a party of Englishmen, and that's precisely what you would be."—*Yale Record.*

CHAPTER II.

Our next emblem is

THE THISTLE.

I once heard an American orator address a Scotch audience, and give t' .n a great deal of credit for many good national qualities, and especially for their industry, pluck, and success in life, not only in the States, but even in Scotland whose well-known emblem is the thistle, indicating thereby, he said, the sterility of the Scottish soil! That seemed to be the chief idea—the erroneous idea, the sterility of Scotland—which our national emblem suggested to the American orator. But to an intelligent Scotchman the Thistle suggests something very different and far better, higher, and nobler than mere sterility. But here we can only give the general outline of the thistle's emblematic teaching, just like the suggestive "heads o' a discourse," leaving the particulars to be noticed further on.

The first thing that attracts our notice about the thistle is its rough, uncouth, and even repellent aspect. It has not the innocent and kindly look of the shamrock or the rose. It bristles like the fretful porcupine. But it is honest. The rose conceals the thorns; not so the thistle. Whatever evil there is in it or about it, its jags, its worst features are all outside; so that, if you have any dealings with it, you may know what you may expect. There is no sham about it. It is perfectly honest. And that is Scotch.

Ah! but when you get beneath or inside of this rough, prickly outside of the thistle what do you find within? You find a soft, couthie, warm heart. But the thistle is not always showing its heart like other flowers: it is only on special, very special occasions it does so. And in this respect it is truly Scotch; for our Scotch folks, especially our Lowland Scotch folks, are not at all demonstrative of their tender affections. They are shy, in fact unco blate in telling their religious experience, or in expressing their friendly feelings, however fervent. Perhaps no other nation on earth has such a song as "Behave yoursel before folk."

But are not the sentimental soul-stirring songs of Scotland the outward expression of Scotland's warm heart? And do not Scotch folk sing them with glowing enthusiasm in their social gatherings? Nae doubt; nae doubt. But then, ye see, the singer is not supposed to be responsible for the sentiments he sings; they may or may not be his. And that explains why it is that the genuine Lowland Scotch, both men and women, will readily sing "before folk" the most sentimental of songs—songs of love and

friendship,—and yet have an utter repugnance to expressing that love and friendship in conversation, except on very special occasions.

The thistle is a hardy plant. It can grow and flourish in any climate and on any soil where any other plants can live, and in climates and places where other plants would perish. The kind of soil is not of much consequence to it, only let it be soil, not bare rock. What Dr. Johnson said of the Scotch who had taken possession of a barren tract of land in America, that, "they would not know it was barren," is true of the thistle, and is true to some extent of some of the early Scotch settlers in this western world, for we have seen some of them who prospered on lands that were considered worthless, and on farms from which the previous owners (not Scotch) had been starved out. The thistle is in fact an extensive land proprietor: takes a strong grip of the soil, and is not easily ejected. Moreover, being a steady, sturdy, solid kind of a plant; having nothing flashy about it, like some others that live fast and die early; the result is, that, when autumn has come, and the last rose of summer and other flowers are faded and gone, the thistle can be seen here and there wagging its pow, and the bees feeding on its sweetness. Thus, the thistle is an emblem of Scotch steadiness, perseverance, industry, and success in difficulties where others are apt to fail.

The thistle is an exceedingly cautious plant. It surrounds itself with armour. One of its mottoes is "In defence," another is "*Nemo me impune lacessit.*" Both of the mottoes are old. They come from a rough and fighting age. They have a defiant tone,

and are apt to impress us with the notion that they are provocative of a quarrel. But if there be wisdom in the maxim, "In time of peace prepare for war," then the thistle's mottoes are commendable; for they speak not of attack or aggression, but simply of defence. They are cautious outlooks for danger, and indicate preparedness to meet it. Scotch folks say that "*Nemo me impune lacessit*" means "Touch me if you dare!" Another very apt translation is "Dinna meddle me an I'll no meddle you"; another is "I'll tak dunts frae naebody." Lord Shaftesbury, the eminent Christian and statesman, on the occasion of his being presented with the freedom of Glasgow, in 1871, gave an address alluding to the character of Scotland and Scotchmen, and made reference to the thistle's motto, and its suitableness to the people who adopted it. Alluding to the possibilities of war in which Britain might soon be involved, he said, "he could not but feel, amid all the terrible threats that we hear, what dangers overhang this our country, and yet at the same time he was encouraged when he thought of the grand old Scotch motto around the Scotch thistle, '*Nemo me impune lacessit*,' which means, in simple language, this,—'Just you let me alone, for if you don't I will give you quite as good as you bring.' That, he owned to be the character of Scotchmen and the character of Englishmen. Their language was the language of defence, and not of aggression." We are glad to think with his Lordship that "this is now the character of Englishmen." But it was not always so, as Scotland very well knows. But Scotland has been improving English character, and England has been

improving that of Scotland. The last great lesson which Scotland gave to England in the improvement of character was given on the field of Bannockburn when king Robert Bruce of Scotland, with 30,000 men, met king Edward II. of England with 100,000 men in battle array; and the 30,000 thrashed, chased, and utterly routed the 100,000, king Edward and all, and taught England the beautiful meaning and practical importance of "*Nemo me impune lacessit.*" If caution, precaution, and canniness mean one and the same thing, then Scotland, by the thistle, has emblazoned *canniness* on her coat of arms.

The only other emblematic characteristic of the thistle that may be noticed is this: it is an enterprising plant. See it when it has bloomed, ripened, and fulfilled its mission in its native place! The first cold blasts of approaching winter blow, and the thistle opens its warm, soft, generous heart, and proceeds to prepare its bairns for their proper places in the world. It says to them, in effect: "My bairns, this place is too small for us all. I am sorry to part with you, but it maun be. It will be much better and happier for us all. The world is wide, and plenty of room in it for the prosperity of young and enterprising thistles. Now that you have been safely nursed through your babyhood, and well trained to be hardy as every good thistle ought to be, and you are decently and comfortably clad, and supplied with ample means for travelling, and with a power of locomotion surpassing almost all other plants, the time has come for us to part. So, fare ye well, and take care of yourselves in this big, rough world."

Now, this enterprising, adventurous, exploring character of the thistle, and wonderful facility in locomotion foreshadow what can be said of Scotchmen. Scotland is too small for them. They are readers, thinkers, and inventors, and are well informed about other parts of the world where intelligent, industrious, and well-behaved folk can be of more use to themselves and others, than in Scotland. And much as they love their native land, and sorry though they be to leave it, yet, having supplied themselves and the world with the means of speedy news and travel, by land and water, which bring foreign countries now-a-days as it were near to Scotland, they do not feel so far away from home after all.

CHAPTER III.

THE PARTICULARS.

Having given out our "heids o' discourse," as we have called them, we must now illustrate them without unduly "enlarging."

We claim some great men and great inventions. But here our national patriotism and vanity must be kept in check by strict justice to other nations; not claiming as ours what really belongs to others. There are certain great men and great women who, by the father's or mother's side, or by some supposed Scotch ancestry, more distant, are reckoned so far Scotch. Such for example were Tom Hood, Alexander Hamilton, Washington Irving, of the United States; Lord Byron, Thomas A. Edison, the inventor, Talmage, Macaulay, the historian, Sir Isaac Newton (see *Edinburgh Philosophical Journal*, No. 3, July, 1820); John Bunyan, as his descendant, Thomas Bunyan, Chief Warder of the Tower of London maintains (see *London Daily News*, and *Pall Mall Gazette* Oct. 1882); Shakespeare also, as the paper called the *Highlander* makes a fair show of proving (see New York *Scottish American Journal* Sept. 16th, 1875). Then there are Eugenie, ex-Empress of France, and members of almost all the royal families of Europe, being descendants of Mary Queen of Scots, through her son James I. of England. Let us give them all up;

we have no right to them; they are not pure Scotch; their best qualities may be inherited from other nations than ours. Besides, we do not need them; we have enough of our own for our present purpose.

I think, nevertheless, that it is but reasonable that we should regard the children of Scotch parents, though not born in Scotland, as being also Scotch, for they inherit from their parents, as a rule, the Scottish character, which is the source, under God, of all that is commendable in the Scottish people. Had the parents been French or Dutch, Chinese or Hottentot, the character of the children would not be Scotch, even though born in Scotland. It is on that account that there are at least three men, namely, General Gordon,* William Gladstone, and Lord Kelvin, whom we cannot surrender to other nationalities, because neither they nor their fathers ever surrendered themselves: but, on the contrary, ever maintained and cherished their Scottish patriotism, Scottish traditions, and Scottish characteristics.

Although born in England and of an English mother, General Gordon, "Chinese Gordon," was every inch a Highlander and a Gordon, but with the Celtic fire, bravery and endurance, sanctified, controlled, and directed by divine grace. His biographers, Hake and Craig, thus speak of him: "It will be interesting to say something of the family to which he belongs, if only to trace to their source the qualities

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* "Look on this man who never feared a man
Or multitudes of men. And yet his life
Was such a calm amid perpetual strife,
That inly like an Eden stream it ran:
Because he feared God, and because that fear
Was a child's reverence for a Father dear."

AT GORDON'S MONUMENT.
St. Paul's Cathedral, London.

which have contributed to the making of his strange and brilliant career. He comes of a race of warriors, son of Lieut.-General W. H. Gordon, whose grandfather, David Gordon, a Highlander and soldier, was taken prisoner while serving under Sir John Cope at Preston Pans. His son was a soldier in the 72nd regiment and other regiments, and was present with Wolfe on the plains of Abraham. His three sons were soldiers in the British army; the third, William Henry, had five sons, three of whom entered the army; the youngest was 'Chinese Gordon,' born in 1830." It is related of him that when on his way in the Soudan to Massowa on a swift camel, he seems to have made a pun of the word *camel*, which is the Scotch pronunciation of the name Campbell, for on his sudden and unexpected arrival at a station he explained it by saying: "The Gordons and the Camels are of the same race; let them take an idea into their heads and nothing will take it out. If my camel feels inclined to go in any particular direction, there he will go, pull as much as you like." Well, whether Gordon intended or not to make a pun, one thing is certain, he ascribes to himself the true Gordon nature and character, which was not that of his maternal ancestors; "for," say his biographers, "his father was every inch a soldier: a man of honour and strict discipline." "The mother," say the the biographers, "came of English merchants who presented a marked contrast to the 'Gay Gordons.'"

The accompanying illlustration, "At Gordon's Monument," and the lines are from the London "Church Monthly," the lines being the first verse of a lengthy fervid elegy in memory of the hero.

Lord Kelvin, better known as Sir William Thomson, Professor of Natural Philosophy in Glasgow University, is the inventor of the electric apparatus of the Trans Atlantic Cable; for which he received the honour of knighthood. He is the inventor also

LORD KELVIN.

of numerous other important scientific instruments including the compass and machine for deep sea sounding, which has done much for the safety of navigation. He has explored and made so many discoveries in various departments of science that his

brother scientists generally accord to him a place second only to that of Sir Isaac Newton. Yet with all his attainments and honours he is a man of unfeigned humility and childlike simplicity. In my lecture on Ireland I conceded his nationality to that country; but Scotch believers in heredity claim him as one of themselves; because his parents were Scotch Irish, and he was brought to Glasgow University when only eight years old, by his father, who was one of the Professors. Certainly if Gladstone, in acknowledging receipt of a New York author's book, could with propriety, say of himself, although born in Liverpool and living his life in England, "I am a pure Scotchman:" and if "Chinese Gordon" although born in England, and of an English mother, could with propriety yet claim not only the name but also the peculiar characteristics of the Scottish clan, Gordon; then with equal propriety may we concede to Lord Kelvin the claim of Scottish nationality.

As with personal excellencies of other nations, so also with respect to their inventions and discoveries, let us be just, giving honour to whom honour is due, even when their inventions or discoveries resemble ours, anticipate ours, or are contemporaneous with them.

Some years ago we saw a patriotic catechism, which was not Scotch, but of another nation, which nation we may call Brobdingnag. The catechism must have been, we think, intended not for public but for private tuition. It was wonderful for the brevity of its questions: but far more so for the brevity of its answers, for each answer consisted only of the same one or two words. Let us endeavour to

imitate it as far as possible. Here is a specimen from memory: "Which nation has the best form of government in the world? Answer: Brobdingnag. Which is the freest nation in the world? Answer: Brobdingnag. Which is the best educated nation in the world? Answer: Brobdingnag.

CHAPTER IV.

AGRICULTURE.

Let us begin with agriculture.

Who, in modern times, has given to the agricultural world the idea and great advantage of underground draining; not of mere swamps or low lands, but of arable high lands? It was Mr. James Smith, of Deanston, Scotland, in his papers of 1833 and 1836.

What nation has given to the world the greatest number and most useful of agricultural implements? Scotland. Let us prove it.

FIRST SCIENTIFIC PLOW.

James Small, a Scot, gave to farmers the first scientific plow by inventing the curved cast iron mould-board, which was formerly straight, made of wood, and covered with a thin sheet of iron to keep it from wearing. He made other improvements which need not be mentioned. The Encyclopedia Britannica, last edition, says, "Ever since the introduction of Small's improved swing plow, the universal belief in Scotland, and to a considerable extent in England, has been that this is the best form of the implement." Some, however, prefer the wheel plow with of course the curved mould-board.

"Mr. Smith, of Deanston, invents the implement

which he calls 'the horse or cultivator,' which, following in the wake of the plow, breaks and stirs the subsoil without bringing it to the surface."

"Mr. Pirie, an ingenious Aberdeen mechanic, has recently invented a 'double-furrow plow,' on an entirely new principle, which has met with general approvement, and has already been adopted by all plow-makers. Three horses and one man with this plow can perform as much work in a day as *four* horses and two men with ordinary plows."

"Rev. William Fisken, a probationer of the Church of Scotland, invented the steam-plow, and the potato-planter." (*Scottish American Journal*, February 14, 1893.)

"Mr. Tennant, at Shields, near Ayr, invented the *grubber*, a most important implement, and now of great notoriety."

"Mr. Sheriff, of West Barns, has invented a machine on the principle of the odometer, for sowing, which registers the space it travels over, and thus indicates the rate per acre at which it is distributing the seed."

THE CRADLE SCYTHE.

"The Cradle Scythe" has given place largely to the reaping machine, but is still used in new settlements and other places where the reaping machine is not available. It has been called the "Hainault Cradle Scythe." All honour to Hainault if he be the inventor. But perhaps Scotland has something to do with it; for we find in the *Edinburgh Magazine*, Vol. VI. for July 21st, and August 18th, 1762, a picture of the veritable cradle scythe, with each of its parts named;

and a letter from Peter Williamson who claims to be its inventor. It is called "Williamson's New Machine for the Reaping of Corn." He says distinctly: "It is my invention . . . it does more and to better purpose, in one day, than six shearers, and can cut down nearly a sheaf at one stroke"; and he wishes to bring it under the notice of the "Honourable Society for the Encouragement of Arts, Sciences, etc.," and offers to teach its use.

THE FIRST REAPING MACHINE.

Scotland gave the first reaping machine to the world. Here we must notice an episode in its history. At the Great Exhibition in England, McCormick and Hussey brought their reaping machines from America, and on trial Hussey obtained the prize. No Scotch machine was exhibited. But in 1752 Mr. Slight, Curator of the Highland and Agricultural Society, communicated the facts that Hussey's machine was purely a Scotch invention: the invention of the Rev. Patrick Bell, parish minister of Carmylie, one of whose machines had been working on the farm of his brother, and doing good work during the past twenty-five years; and that four of these machines had been sent over to America. Of course, both McCormick and Hussey, whose machines were on the same principle as Bell's, were mum as to where they had gotten their idea.

FANNERS.

Rev. John Arkle, of Hawick invented fanners to separate the chaff from the grain.

THE FIRST THRASHING MACHINE.

Scotland gave the first thrashing machine to the world. Says the Encyclopedia Britannica: "It is now sixty-five years since an ingenius mechanic, Andrew Meickle, produced a thrashing machine, so perfect that its essential features are retained unaltered to the present day." Andrew, I believe, was a civil engineer, and belonged to Haddingtonshire; and he erected his first thrashing machine, for Mr. Stein at Kilbeggie, Clackmananshire. Haydn mentions that Michael Menzies, at Edinburgh, invented a machine for the same purpose in 1732; but Meickle's of 1776 is that now in general use.

MACADAMIZED ROADS.

Scotland gave macadamized roads to the world. What a blessing to farmers to get their produce to market, as well as to the general public who use horses. John London McAdam was born in Scotland in 1756 (see Beeton and Chamber's Encyclopedia). The other great road-maker was Tom Telford, a Dumfriesshire chield, who improved on McAdam's plan by placing large stones for the support of the "broken metal." But we have more to notice of Telford's genius.

FIRST AGRICULTURAL SOCIETY.

Scotland gave the first Agricultural Society to the world. Haydn says, "The first society for the promotion of agriculture in the British Isles, of whose history we have any account, was the *Society of Improvers of Agriculture* in Scotland, instituted in

1723." That was in fact the originator of all Agricultural Societies, and farmers' institutes, for township, county and province, throughout the British dominions, if not also for other countries.

Scotland gave the first flax mill to the world. Says Haydn, "The first flax seed was planted in England in A. D., 1533. For many ages the core was separated from the flax, (the bark of the plant,) by the hand. A mallet was next used; but the old methods of breaking and scutching the flax yielded to a water-mill which was invented in Scotland about 1750." Retting, that is rotting flax by steam, was introduced by W. Watt, of Glasgow, in 1852, and subsequently modified and improved by J. Buchanan.

MILKING MACHINE.

Farmers and dairymen who have many cows find the milking process tedious, tiresome and in other respects disagreeable. Here is something for their benefit. Says the *American Agriculturist* of July, 1891: "The milking machine invented and patented by Wm. Murchland, of Scotland, has been subjected to repeated, practical trials and gives promise of being a good thing. It is only for large dairies. It will soon be introduced into this country."

The Toronto *Mail and Empire* for August, 1895, has a long article from James Mills, of the Agricultural College, Guelph, stating that the college has one of the Thistle Mechanical Milking Machines, invented four years ago by Alexander Shields, M. B. C. M., B. Sc., of Glasgow, Scotland, and manufactured there; which is a great success. With it a man and

a boy, or even the man alone, can milk twenty-six cows in from twenty to twenty-six minutes.

THE FIRST ARTIFICIAL ICE MACHINE.

The manufacture of artificial ice for the dairy, for the hotel and for domestic use in summer, has become one of the great industries of our day. In the United States alone nearly $10,000,000 is now invested as capital in the manufacture, and the product in 1890 was valued at $4,900,000. Who has first had the honour of making a machine for producing artificial ice? France claims the honour, because M. Carre, in 1857, brought out a fairly workable machine, on the absorption system. Then the United States claim Mr. D. Livingston Holden (now a man advanced in years) as the father of the compression system, by which the bulk of artificial ice is made in that country. But Scotland anticipated practically both of these systems long before France and the United States adopted them, as the following may show:

"Dr. Cullen, in 1755, discovered that the evaporation of water could be facilitated by the removal of the pressure of the atmosphere, and that by doing this water could be frozen. Nairn, in 1777, discovered that sulphuric acid would absorb the vapor of water if placed in a second vessel separate from that containing the water, but connected with it. This discovery he put to use in 1810 by constructing an apparatus for absorbing the vapor of the water that it was desired to cool or freeze. This apparatus greatly facilitated the freezing operations of a vacuum freezing machine."—*Cassier's Magazine.*

"Then" says a recent number of the *Scottish American*, "Mr. David Boyle, the inventor of a machine for making ice, who died lately at Mobile, Ala., was a native of Johnstone, Renfrewshire; born in 1837. He made a considerable sum of money by selling ice-lemonade. This lead him to devise a machine to make ice, by extracting the heat from the water by means of compressed ammonia."

Scotch folks are fond of sports on the ice—skating, shinty and especially the "roarin game" called *curlin*. But the ice is not always to be trusted. The same journal tells us that "a life saving board for skating ponds" has just been designed and presented to the Greenock Police Board by Mr. Robert Davie. Its claims are simplicity, efficiency, and cheapness. It consists simply of a pine board fifteen feet long, with a cross piece of elm six feet in length. The board is furnished with rope handles, will support one or two persons who go to the rescue, and the weight of the whole thing is about fifty pounds, so that any lad could run with it from one place to another.

LIFE-SAVING HONOUR TO A SCOT.

"The Hon. Sidney Holland, acting president, acted as chairman at the annual meeting of the Royal Humane Society held in London on the 28th ult. The society has maintained its collective energies, and has greatly increased in strength, over 70 per cent. having been added to the membership roll. The chief aim of the society is to teach the best means of saving life from drowning. Over 3300 candidates from classes in the United Kingdom and the colonies have passed the proficiency tests, being awarded certifi-

cates and medallions, this being an increase of 1200 during the year. Many of these have been instrumental in saving life from drowning and have received the R. H. S. certificate and medal for bravery. Six candidates received the awards in 1897. Mr. Wm. Nelson, of Glasgow, the inventor of the life-saving drill, was elected vice president as a reward for his energies in the past, and he was also awarded the honorary certificate and medal of the society, these being acceded to unanimously.—*Scottish American*, March 16, 1898.

HORTICULTURE.

Scotland has given to the world perhaps the largest share of light on the subject of horticulture, or gardening. Many writers on this subject might be mentioned but let the following suffice:

Says Chamber's Encyclopedia of English Literature, Vol. II, 697, "John Claudius Loudon (1783–1843) stands at the head of all the writers of his day upon subjects connected with horticulture, and of the whole class of industrious compilers. He was a native of Cambuslang, in Lanarkshire, and pursuing in youth the bent of his natural faculties, entered life as a landscape gardener, to which profession he subsequently added the duties of a farmer. Finally he settled in London as a writer on his favourite subjects. His works were numerous and useful, and they form in their entire mass a wonderful monument of human industry. His chief productions are an Encyclopedia of Gardening in 1822; the Greenhouse Companion; and Encyclopedia of Agriculture, 1825; an Encyclopedia of plants, 1829; an

Encyclopedia of Cottage, Villa, and Farm Architecture, 1832; and Arboretum Brittanicum, eight volumes, 1838."

VETERINARY COLLEGES.

What nation had the honour of first giving to the world those scientific and humane institutions called veterinary schools and colleges? Not Scotland, but France. Germany was the next to possess them; then London, England. London secured the services of M. St. Bell, a Frenchman, as Professor. He died in 1792. The Encyclopedia says, that on St. Bell's death, "John Hunter and Cline recommended Coleman and Moorcraft, neither of whom had much experience." "This is the parent of other schools in Great Britian." But who was John Hunter? Let the Encyclopedia Britannica answer. "John Hunter, 1728–1793, as a physiologist and surgeon combined, unrivaled in the annals of medicine. Born at Long Calderwood, in the parish of East Kilbride, Lanarkshire. He dissected over 500 different kinds of animals, some of them repeatedly. A man of public spirit, and generous with his money for every good cause. In his lectures, in London, about 1774, on the Theory and Practice of Medicine, he had in his class such distinguished names in the medical profession, as Abernethy, Carlisle, Chevalier, Coleman, Astley Cooper, Home, Lynn, and Macartney." So valuable were his discoveries in pathology, and his improvements in surgery, such as the cutting through tendons for the relief of distorted and contracted joints, etc., that when he died he was honoured with burial in Westminster Abbey. He is thus referred to

in Edward's Encyclopedia of Religious Knowledge, under the term *physiology*. "Mr. Hunter, of whom we here present an engraving, was the first in England who investigated disease in a strictly philosophic method: bringing to bear on it the clear and steady lights of anatomy and physiology. He began by discarding all the doctrines of the schools, and resorted at once to nature. Instead of creeping timidly along the coast of truth, he boldly, launched into the great ocean of discovery, steering by the polar star of observation, and trusting to the guidance of his own genius."

Such a man must have occupied a high position, if not the highest, among those associated with him in connection with the London Veterinary College; and it is more than probable that he had much to do with establishing it, and in maintaining its efficiency while he lived.

In 1819-20 a veterinary college was established in Edinburgh with Mr. Dick as Professor. He had been a student of Coleman's—the Coleman whom Hunter had taught and recommended in London. Dick was a man of great ability and perseverance. He died in 1866. He gained the patronage of the Highland and Agricultural Society, of Scotland; and during his time the examining board of the college was composed of the most distinguished medical men in Scotland, such as Goodsir, Syme, Lizars, Ballingal, Simpson, and Knox. With such eminent men at the head of the institution it is not surprising that the Edinburgh Veterinary College rose to a high place in veterinary science and practice; students who have been licensed by it have carried that

science and practice over Scotland, and have abolished the ignorant nostrums and barbarous practices of the old farriers. Toronto Veterinary College is, I understand, an offshoot from that of Edinburgh, its first professor being from Auld Reikie; and its beneficient influence is felt not only over Canada, but even in the United States, where some of its students are practicing.

Who invented the horseshoe with screw cogs for frosty weather? Let the following item from a recent number of the *Scottish American* tell:

CARLYLE AS AN INVENTOR.

"Among the relics shown in Carlyle's house at Chelsea is one which proves that the great writer was also a master farrier. The proof of this is found in a case in the dining-room, which contains a horseshoe with screw cogs for use in frosty weather, invented by Carlyle in 1834. It is said that this shoe, which was regularly used at Craigenputtock, is practically the same as the one now universally used, and that the credit of the humane invention of the screw cogs, about which veterinary authorities and blacksmiths have had many disputes, really belongs to Carlyle."

THE NAILLESS HORSESHOE.

And a further Scotch boon to the horse is the nailless horseshoe. Says the *Scottish American*, August 17, 1898:

"One of the most recent novelties, which will, we think, be welcomed as a boon to horsekeepers as well as the animals under their charge, is a shoe patented

by R. M'Dougall, of Wellington street, Glasgow, which can be affixed to the hoof without nails. In a recent trial of the nailless horseshoes the new invention was put to a severe test—the horse on which the shoes were fitted being attached to a heavy-laden van and worked up steep gradients and on granite-paved streets. Notwithstanding this rough work the shoes showed no signs of shifting, and were not removed until worn out. The new shoe obviated all risk of pricking or laming by nails, and a slight rasping of the hoof is all that is required in attaching it to its bed.

MEDICAL SCIENCE.

Scotland has greatly benefited the world by her contributions to medical and physiological science.

In Burns' poem on "Death and Dr. Hornbook," mention is made of "Buchan an' ither chaps." Now, who was Buchan? He was a Roxburghshire chield, born at Ancrum in 1729, and died in 1805. He wrote three medical works, two of which passed three editions each; but his popular and famous book on *Domestic Medicine* attained a circulation of 80,000 copies during his lifetime. In one edition of it published in Cincinnati, U. S., in 1843, and edited by J. C. Norwood, M. D., it is stated that the Domestic Medicine had by that time, been published in "upwards of twenty large editions in England; and had been translated, by physicians of eminence, in every language of modern Europe; and that with a few alterations and additions it forms the substance of every work on popular medicine which has appeared since the author wrote."

But Scotland has given the medical profession and to "suffering humanity" not a few "ither chaps" for whom the world ought to be grateful. But the list of such men is too long to particularize any excepting a very few. John Hunter's brother, William, was so distinguished in his day, that the Encyclopedia Britannica speaking of him says, he was a "celebrated physiologist and physician, and the first great teacher of anatomy in England." He died in 1783. John bequeathed his valuable museum to London; William gave his, with 8000 pounds endowment, to Glasgow University, and it is known as the Hunterean Museum. Dr. James Young Simpson was the discoverer of chloroform as an anæsthetic agent. "For this triumph of science he was rewarded with a prize of 2000 francs from the Paris Academy of Sciences, and was elected member of the learned societies both in England and upon the continent of Europe." Sir James Wylie was physician to Nicholas the late Czar of Russia. Dr. Matthew Bailie, the distinguished anatomist and physican to George III. His monument is in Westminister Abbey. Sir James Clark, physician in ordinary to the Queen, who by his writings on medical subjects and his merits as a skilful physician has earned for himself the title of baronet. Many other Scotch doctors might be mentioned but let these suffice.

CHAPTER V.

AGE OF IRON AND STEAM.

The civilized and a great part of the uncivilized world have been living for a good many years past in the age of iron and steam:—iron ships, iron cables, iron horses, and iron roads and bridges. Let us see what share Scotland has had in bringing about this state of things.

FIRST FAN BLAST.

Who invented the fan blast for the smelting of iron, and forging purposes? It was James Carmichael of Dundee, in 1829. In 1818 he invented also an improved plan for reversing the gear of marine engines —"a most splendid invention."

FIRST HOT BLAST.

Who invented the hot blast for smelting iron? James Beaumor Nelson.

FIRST STEAM-HAMMER.

Who invented the steam-hammer, which can come down with a stroke of many hundred weight, or with one which can only crack an egg-shell without crushing the egg? It was James Naysmith, an Edinburgh

chield. He was the inventor also of the pile-driver, the double-face wedge sluice valve, the safety foundry ladle, a steam-engine now almost universally employed in screw steamships, and a spherical seated safety valve.

CHEMISTRY.

Says the Bulletin of the American Iron and Steel Trade, (1890) "Bessemer, the Englishman, invented in 1855 the process which bears his name and is the flower of all metallurgical achievements—a share in the honour of this invention, however, being fairly due to the co-operating genius of Robert F. Mushet, also an Englishman, but born of Scotch parentage." But we must go back to a chemical discovery which led to Bessemer's. Professor Black of Edinburgh University, "discovered *fixed air* or *carbonic acid gas* in marble and other solids, together with a train of important consequences. This is the foundation of Bessemer's discovery of working iron."

Black, who was professor of chemistry, also discovered *latent heat* and *specific heat*. These discoveries laid the foundation of James Watt's scientific investigations and discoveries in connexion with the steam engine. Black was born at Bordeaux, of Scotch parents, 1728, and died at Edinburgh 1799. He was a true Scot. Watt and Black were unco sib at Glasgow college; Watt was also indebted for much scientific light to professor Robison.

Sir John Leslie (1766–1832) professor of mathematics in Edinburgh University, and a writer on various branches of science, was the first to enlighten the scientific world on the subject of radiant heat.

Who first discovered nitrogen gas? Professor Rutherford, of Edinburgh, in 1772.

Who invented chloride of lime? It was Charles Tennant, of Glasgow, thus revolutionizing the whole art of bleaching. McIntosh cloth came from the same city.

A NEW ARTIFICIAL STONE.

"A Scotch firm is manufacturing an artificial stone which is said to stand every test and to be impervious to all vagaries of the weather. The process is a simple one, and the ingredients of the stone, chiefly lime and sand, are not expensive commodities, so that it is believed that the artificial product will be able to compete with the real. The lime and sand, having been thoroughly incorporated, are passed into moulding boxes, which may be of any convenient size or shape, and these are placed within the converter. Water at high pressure and having a high temperature is then pumped into the converter to cause the necessary chemical union between the lime and sand, and the moulding boxes are also submitted to a temperature of about 400 degrees Fahrenheit by the action of superheated steam. In about thirty hours the surplus water is run off, but the heat is continued, in order to remove moisture from the moulding boxes, for another nineteen hours. The boxes are then removed from the converter and the stone within them is practically ready for use.

"Experiments are now in progress from which it is hoped that other products of nature's laboratory, such as slate and marble, will presently be successfully imitated." *N. J. Advertiser*, October 12, 1898.

As I may now have occasion to refer to Mr. Robert McFarlane as an authority on matters scientific, it is proper that I should state who he was, for he is now dead some years ago. He was a genuine Scot, from Rutherglen, near Glasgow, and was for a considerable number of years Editor of the New York *Scientific American*. As became one in his position he was an "all-round scientist," and withal he was a devoted Christian. Having been long intimate with him I asked him, some years ago, to favour me with a list of some Scotch inventions, which he readily did. To that list I refer with confidence.

As we have yet to speak of steamboats which require harbours and docks, and of locomotive engines which require strong bridges to support the ponderous weight of engine and train, let us prepare the way for the accommodation of these marvels of mechanical ingenuity. This requires civil engineering.

CIVIL ENGINEERING.

Scotland has produced some of the greatest civil engineers which the modern world, at least, has ever known. We need only mention the names of three or four, and barely mention their works. "William Fairbairn," says Beeton, "was born at Kelso, about 1780. He was among the first, if not the very first, to construct sea-going vessels of iron. He was also constantly engaged in experimenting on the quality of iron, and did much to advance mechanical knowledge in the department of engineering." McFarlane says that he (Fairbairn) was the real inventor of tubular bridges. "Stephenson conceived his idea (of his famous Britannia Tubular Bridge) from Sir William

Fairbairn's remark, that an iron ship on the crests of two waves becomes an absolute tubular girder for the time being." (Peter MacQueen, in the *Cosmopolitan*, Aug., 1892.) Fairbairn had much to do with that bridge.

Thomas Telford (1757–1834) was born in Eskdale, Dumfriesshire; went to London, and after having built about forty bridges in different places, he made the canals to connect the Severn, the Dee, and the Mersey. He made the Caledonia Canal; the Glasgow, Paisley and Androssan; the Macclesfield; the Birmingham and Liverpool Junction; and the Weaver Navigation in Cheshire, were either entirely or partially constructed by him. The Gotha Canal in Sweden was his work. He was commissioned to make roads and bridges all over Scotland, and to build churches and manses in the Highlands. The improved road from Holyhead to London; the Menai Suspension bridge; the St. Catharine's Docks, London, and the harbour works of Aberdeen and Dundee are his. He also was a writer on architecture, civil architecture, and inland navigation, and left large sums of money for the advancement of science. The Encyclopedia Britannica (8th Ed. Diss. VI.) says, "Telford, though not the contriver of suspension bridges, yet deserves notice from the superior boldness and solidity of the noblest work of the kind which has yet been executed—the Menai bridge."

John Rennie was a farmer's son; studied under Drs. Black and Robison; went to London in 1780; built Waterloo bridge over the Thames, and the Southwark iron bridge over the same river. The Grand Western Canal, from the mouth of the Exe to Taun-

ton; the Aberdeen Canal, and the Kennet and Avon Canal were his works. He designed the London docks, the East and West India Docks in London; and those of Greenock, Leith and Liverpool. The designs for London bridge were made by him, but were carried to completion by his son, Sir John Rennie, after his death. He also furnished plans for the improvement of the dock yards of Portsmouth, Plymouth, Chathan, and Pembroke; erected the pier at Holyhead, and designed the enlargements of the harbours of Berwick, Newhaven, etc. He was born at Phantassie, Haddingtonshire, 1761, died in London, 1821, and was buried in St. Paul's Cathedral.

John Scott Russel was born in the vale of Clyde in 1808, and studied mathematics and the physical sciences at Edinburgh and Glasgow, where he graduated in 1824. Went to London in 1844, where he directed his attention to the construction of iron vessels. In 1835 he built a ship upon his newly discovered "wave principle" which, together with other vessels subsequently constructed upon the same model, was perfectly successful. His greatest achievement, however, was the Great Eastern. He was fellow of the Royal Society of London, Secretary of the Society of Arts, and was one of the most active members of the commission of the great Exhibition of 1851. In 1837 he received from the Royal Society of Edinburgh, of which he was a member, a gold medal for his proposed improvements in the form of vessels.

Beeton says, "The first stone of Blackfriars' Bridge, London, was laid October 31, 1760, and it was completed by Milne, in 1770." This Milne was a

Scot, and of an ancient family of architects of that name. The *Scottish American Journal*, February 3, 1892, says: "A new book will be issued this year on the 'Master Masons to the Crown of Scotland'—a book of immense research. Special attention has been given to the remarkable career of Robert Milne, the architect of Blackfriars' Bridge; and beautiful engravings are to be given of the medals which were presented to him by the two Popes, Clement XIII. and Clement XIV. These medals were piously deposited by him in the foundation stone of Blackfriars' Bridge, and were recently discovered, a century afterward, during the repairing of the structure. He was surveyor of St. Paul's Cathedral, London, during fifty years; and it was at his suggestion that the famous memorial inscription to Sir Christopher Wren—*Si monumentum requiris circumspice*—was placed in that structure." Out of sixty-nine plans presented by candidates for building Blackfriars' Bridge his alone was adopted. He was honoured by burial in St Paul's, in 1811.

England has received quite recently another benefit from Scottish engineering genius in the construction of the Manchester canal; for says the *Scottish American Journal* of January 31st ult., "Rothesay is proud of the fact that the inception of the Manchester Canal was greatly due to a Rothesay man—Mr. George Hicks."

To record the many triumphs of Scotch civil engineering throughout the world is more than our space and time would permit. Take only one or two additional: the first of which is near home—the Canada Pacific Railway, which, considering its extreme

length and the formidable obstacles to be overcome, is one of the greatest achievements of the engineering art the world has yet seen. Who have been the most prominent men in its formation? Sir John McDonald was its far-seeing and indomitable projector. Sanford Fleming its chief engineer, assisted by the genius, energy, and courage of William Mackenzie and James Ross. The syndicate who, aided by government, shouldered the enormous financial responsibility were chiefly such men as George Stephen, Duncan McIntyre, Robert Angus, Sir John Rose, and Donald Smith. All Scots, ilka ane o' them.

Then there is the new Sault St. Marie Canal, recently opened, having its five gates all worked with almost incredible speed by electrical power—the first instance of this power being thus used—the whole designed by an Aberdeen man, Mr James B. Spencer of Ottawa, Chief Draughtsman of the Department of Railways and Canals.

Take one other instance but far away in India. It is the largest masonry dam in the world; a stupendous work of engineering, lately completed by Glover and Co. of Edinburgh. It supplies Bombay daily with one hundred million gallons of water.

CHAPTER VI.

THE STEAM-ENGINE.

Who gave the first steam-engine to the world? It is hard to tell. Long, long ago, 120 B. C., a philosopher of Alexandria in Egypt named Hero is said to have invented a machine consisting of a hollow globe from the sides of which projected bent open tubes: and that when steam was admitted into the globe its action on the tubes caused the globe and tubes to revolve. At the beginning of the seventeenth century, a genius of the name of Ramsey (no doubt a Scot) at the Court of our James VI. and I. of England, seems to have anticipated and patented something of the present form and uses of the steam-engine. (Brayley and Britton's History of the ancient Palace and House of Parliament at Westminister, p. 382.) Then considerably later come other inventors—Papin, Savèry, Worchester, Newcomen, and Cawley. But all the world knows that it was by James Watt, a Greenock chield, that the steam-engine was brought to its present perfection. His four great inventions—the separate condenser, the appendages for parallel motion, the double acting cylinder, and the governor, made the steam-engine what it now is capable of spinning the finest thread and of rushing along at the rate of seventy miles an hour dragging a train of hundreds of tons weight behind it.

Who gave the first locomotive engine to the world?

THE STEAM LOCOMOTIVE.

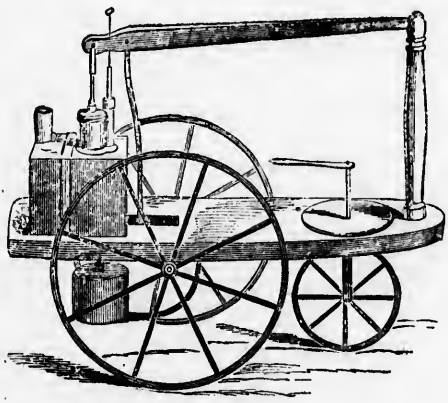
Frenchmen, Americans, and Englishmen all claim the honour. In 1769 one, Moore, a linen draper, made one; in the same year Cugnot, of Lorraine, constructed one; and in 1772 Oliver Evans, an American, is also credited with the honour. But all these are antedated by the design for a steam-carriage, by Dr. John Robison, at the age of twenty-one, which he published in the *Universal Magazine* for November, 1757. He also, says The Encyclopedia Britannica, directed Mr. Watt's attention to the steam-engine in the same year, with a view to this very application. Watt actually made a model on Robison's suggestion. Watt never lost sight of the locomotive, although engaged in many other inventions. "In Watt's patent of 1784 the steam-carriage forms the seventh article, and in the same year Mr. William Murdoch, a member of Boulton and Watt's establishment (at Soho), made a model, acting by high-pressure steam, which drove a small waggon round the room." This model was exhibited in the Great Exhibition at London in 1851. Here I give from the *Illustrated Exhibitor* a picture of the model, and the *Exhibitor's* remarks in connexion:

"The history of the steam-engine is the history of all enterprise and ingenuity for the last seventy years and it were as impossible to speak of industrial progress without reference to it as it would to describe the French Revolution and omit Napoleon.

"The words of Dr. Darwin were prophetic:

> 'Soon shall thy arm, unconquered steam! afar,
> *Drag* the slow barge, or *drive* the rapid car!'

and it is interesting to compare them with those of James Watt, whose fame is limited only by the bounds of civilization. 'My attention was first directed in the year 1759 to the subject of steam-engines by the late Dr. Robison, then a student of the University of Glasgow, and nearly of my own age. He at that time threw out an idea of applying the power of the steam-engine to the moving of wheel carriages and to other purposes: but the scheme was not matured, and was soon abandoned on his going abroad.'



"The visitors of the Exhibition have doubtless looked with curiosity on 'The Working Model of a Locomotive, made in 1785, by William Murdoch, of Soho, Birmingham,' of which we give an engraving.

Mr. Murdoch was a man of great ingenuity. Of this there is sufficient proof in his paper in the 'Philosophical Transactions' for 1808, on 'The Application of Gas from Coal to Economical Purposes,' for which the Royal Society presented him with the large Rumford gold medal. He had previously proved, for many years, a most able and zealous agent in carrying out the plans of Messrs. Boulton and Watt, in the introduction of their engines into Cornwall; and afterwards, in the construction and carrying forward of their works at Soho. Watt refers, in one of his works, to several of Murdoch's very ingenious inventions, and also to his construction of tools for the manufacture of machinery. In these circumstances he made the model now referred to, the first locomotive ever applied to the drawing of carriages, as described in the specification of Watt's patent. 'I intend, in many cases, said that eminent man, 'to employ the expansive power of steam to press on the piston. In cases where cold water cannot be had in plenty, the engines may be wrought by this force of steam only, by discharging the steam into the open air after it has done its office.' A friend of Mr. J. P. Muirhead saw this model drive a small waggon round the room in Mr. Murdoch's house at Redruth, at Cornwall.

"In a letter from Dr. William Small to Mr. Watt, dated September, 1786, he says: 'Your very clever friend, Mr. Robison, and his pupil, passed Friday evening with me, to my great satisfaction. I told them I hoped soon *to travel in a fiery chariot* of your invention!' The tribute afterwards borne by Watt to the chief of these visitors was fully merited: 'It

was with great concern I learnt the other day the death of my worthy friend, Professor Robison. He was a man of the clearest head and the most science of anybody I have known, and his friendship for me only ended with his life, after having continued nearly half a century.' Mr. Muirhead states that among the persons who saw this 'working model' at Mr. Murdoch's was Mr. Richard Trevethick, who, in 1802, took out a patent for an engine to be applied to the driving of carriages, using the same principle with variations.

"It is interesting to examine this model, in connexion with those complex, and, in some instances, stupendous machines, of which the Exhibition supplies so many examples. Franklin said of the first balloon: 'It is a babe; but it may become a giant.' The balloon, however, is a 'babe' still; while the locomotive presents to it a most striking contrast; if, in this model we have 'the babe,' 'the giant' is at hand inviting our contemplation. But it appears that the idea of a *rail* never entered the mind of Watt; all that he seems to have considered was the movement of a carriage by steam on ordinary roads."

All honour to Trevethick and Stephenson who, although neither of them invented the locomotive, yet vastly improved it, and put it to practical use.

James Watt was an inventor of other things besides those connected with the engine. He invented the copying press; a steam drying machine; a machine for copying sculpture; and was an experimenter in photography. Two of his pictures of the old Soho house, on copper plates, by the old process, are in the

patent museum. He also made improvements in bleaching, principally derived from the great French chemist, Berthollet, which improvements he communicated to Mr. McFarlane's grandfather, a relative of Watt's by marriage.

GAS LIGHT AND OTHER LIGHTS.

Who has had the honour of lighting up the civilized world with illuminating gas, thereby abolishing the old whale oil lamps in city streets and similar lamps and tallow dips and snuffers in shops and places of public resort? No man has had the honour of "inventing" gas, for long before it was applied extensively to human use it was known as a natural product of certain mines and wells; and between the years 1658 and 1739, papers on the subject were read, by men of science, before the Royal Society in London. The Rev. Dr. Clayton, Dean of Kildare, Ireland, gave an account of his experiment in the distillation of gas from coal, and in 1789 Lord Dundonald used it occasionally in lighting up Culross Abbey in Scotland. But gas was regarded mostly as a chemical curiosity, and was put to no general practical use until the year 1792, when William Murdoch, a Scot, a man of many useful inventions, applied his knowledge of chemistry and practical acquaintance with mechanical science to the production of the apparatus required for the distilling and refining of coal gas, and its conveyance by pipes for general use in illumination. For this boon to the world, and for other products of his inventive genius, William Murdoch ought to be better known to his countrymen. I therefore do not hesitate to insert here the following

lengthy extract from an American paper to his honour:

MURDOCH AND THE INVENTION OF GAS LIGHTING.

"'Ballochmyle,' in the *Leeds Mercury*, says: The recurrence of the 96th anniversary of the first public use of gas coal for lighting purposes (April 29, 1802) reminds us that science has its romances no less fascinating and no less renowned than the triumphs and failures, the joys and griefs, of human life. It is a popular delusion that William Murdoch was the 'inventor' of gas for illuminating purposes, but it would ill become any one of his countrymen, clansmen or descendants to try to minimise the splendour of his genius and inventions by which the practical use of coal gas as an illuminant was first made possible and triumphantly realized.

"William Murdoch was born near Old Cumnock, his father combining the work of a millwright and flower miller—a very common form of 'trade union' a hundred odd years ago, and not quite extinct in the south-west of Scotland even yet. Murdoch, Sr., was undoubtedly the inventor of the iron-toothed system of gearing, and I have seen a wheel of that stamp which he not only designed but made by his own hands in a neighbouring smithy—a rough but strong and thoroughly effective bit of mechanism. Until he was over 20 years of age William worked in the parental mill, or mills, and it was by his father's example his mechanical genius was inspired and his eyes and hands trained to fashion the realized ideals of mechanical invention. For the remaining facts of his public career I must have recourse to the admir-

able biographical summary which appears in volume VII of the 1891 edition of Chamber's Encyclopedia.

"In 1781 William Murdoch entered the employment of Boulton & Watt, Birmingham, and showed such marked ability that he was sent to Cornwall to superintend the erection of mining engines there. At Redruth he constructed, in 1784, the model of a high-pressure engine to run on wheels. Watt showed some jealousy at these efforts; but Boulton offered him a reward for an engine capable of carrying two persons and the driver. His labours in Cornwall were arduous, although he had not more than £1 per week up till his forty-fourth year, and a request for an increase of salary not being promptly acceded to, he made up his mind to change. The mining companies, at last realizing the value of his services, offered him £1000 pounds a year as chief engineer at the mines. But he declined and returned to Boulton & Watt, who gave him a like salary as general manager of Soho Works. Murdoch's inventive brain was never idle; he introduced labor-saving machinery, a new method of wheel rotation, and an oscillating engine (1785) of a pattern still in use. He also improved Watt's engine; introduced a method of casting steam cases for cylinders in one piece, instead of in segments; a rotary and compressed air engine; a steam gun; cast-iron cement; a method of heating by circulating water through pipes; a method of sending messages through an exhausted air tube; and many other inventions. His investigations in the distillation of coal gas began at Redruth in 1792, when he lighted his offices and cottages by its agency. He publicly showed the results in 1797 and 1798, the

premises at Soho being lighted with gas. But he did not reap due profit from this useful invention. Murdoch read a paper on the 'Economical Use of Gas from Coal' before the Royal Society in 1808. He died in 1839.

"There is no doubt that it was Murdoch's invention of the hydraulic main, and wet-lime purifier, and the water meter, that enabled him to apply 'distilled coal gas' to domestic and public lighting purposes. He lit up his own house with gas at Redruth, when he resided in Cornwall (1792), in 1798 he lit up the Soho factory of Boulton & Watt at Birmingham, in 1805 he had a thousand burners ablaze in the cotton mill of Messrs. Phillips & Lee at Salford; in 1801 Le Bon lighted his house with gas in Paris, and in the April of 1802 he had a portion of the public streets in Paris illuminated in the same way, and in 1810 was forming the first Chartered Gas Company, and for the first time (1813) Westminster Bridge was lighted by gas."

And who invented the Drummond light, known also as the lime or calcium light? It was Captain Thomas Henry Drummond, an Edinburgh genius; inventor also of the heliostat, so useful to surveyors.

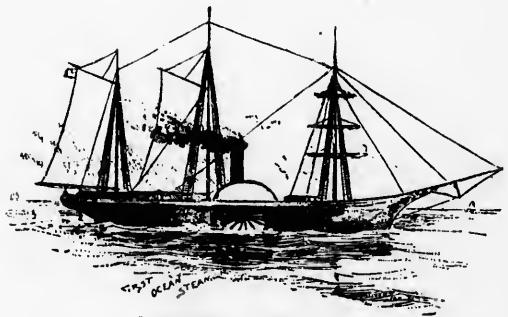
Elecriticity is now taking the place largely of gas as an illuminant; but when we come in our story to speak of electricity we shall find that Scotchmen have been in the very forefront of the world's pioneers in electrical science and its practical application to human use.

CHAPTER VII.

FIRST OCEAN STEAMER.

Who had the merit of first giving the steamboat to the world? Three nations claim the honour. Let us give honour to whom honour is due.

France claims that the Marquis de Jouffroy put a steamer on the Doubs in 1776, and more successfully



THE ROYAL WILLIAM.

on the Saône in 1783, but failed to carry out the invention into common use for want of means and support. The Academy of Sciences acknowledged his claim to the discovery in 1840.

Some Americans claim John Fitch, a native of Pennsylvania, as the real inventor of the steamboat; and that he had one in actual operation on the Delaware river in 1787, and more successfully in 1788. He also failed for want of means and support.

The Americans also claim Robert Fulton as a native of the States and the inventor of the steamer, who placed his invention on the Hudson river in 1807, which was quite a success. They regard him as "the father of steam navigation."

All honour to Jouffroy and Fitch. If what be said of them be true they deserved better from their countrymen and the world.

But we are not done with Fulton. It is very doubtful whether he were a native American. Here is what appeared in the *Scottish American*, February 1, 1877.

A CURIOUS QUESTION.

To the Editor of the Scottish American Journal:

"DEAR SIR:—I clip the following from a late number of the Philadelphia *Presbyterian*:—'John Stevenson writes to the *Glasgow News* that his granduncle, Robert Fulton, instead of being born in Pennsylvania of Irish parents, as his American biographers say, was Scotch, and was born in Beith, in Ayrshire. Mr. Stevenson says that in consequence of having offered a torpedo invention to the French, Fulton concealed the fact of his Scottish origin as much as possible, and when last in Scotland only visited his relatives by stealth, being afraid that proceedings would be taken against him by the British Government."

Fitch's friends maintain that Fulton saw Fitch's boat; and the Encyclopedia Britannica says, "he had seen the relics, in Scotland, of Symington's last experiment," so that he could not justly be called the inventor. Indeed I have not seen it stated that he claimed to be such. His boat was supplied with a Boulton and Watt engine. He deserves great credit for his pluck, perseverance, and success in introducing steam navigation into the States.

Scotland justly claims the invention of the steamboat, at least equally and independently of both France and the United States. "The *idea*," says the Encyclopedia Britannica, "of the application of the steam-engine to move ships was already a familiar one to the minds of many persons about the middle of last century." "The first experiment entitled to be called successful was made by Mr. Miller of Dalswinton, in Scotland conjointly with Mr. James Taylor, tutor in his family, who together formed the project of moving vessels by means of paddle-wheels driven by a steam-engine, and realized it with the aid of Symington, a practical engineer. Miller had been working at the matter before employing Symington, how long before we know not. Their first boat was put in operation, on Dalswinton Loch, Dumfriesshire, in October 1788. The subject was pursued by Symington and others. In 1789 a larger vessel was propelled on the Forth and Clyde canal. That is about eighteen years before Fulton.

But, says Haydn, "The first idea of steam navigation was set forth in a patent obtained by Jonathan Hulls in 1736." This is the earliest claim of all; but we have never seen any proof that Jonathan's "idea"

ever "materialized" in the form of a steamer. One thing is certain that after Symington's successful trip on the Forth and Clyde canal the next steamers, in Britain, were those that began to ply on the Clyde in 1812; and Beeton says that, "the first steam-vessel on the Thames was brought by Mr. Dodd from Glasgow."

It need scarcely be noticed that "Clyde-built steamers" constructed by such as Napier, Denny, Steele, Scott, Caird, etc., are famous all the world over. And not only steamers of the ordinary class, as the following item of news intimates,—"Glasgow, March 4th, (1892)—Her Majesty's ship Ramalies, the largest ironclad in the world, was launched yesterday at Thomson's yard, Clydebank."

FLOATING GRAVING DOCKS.

Who was the inventor of the floating graving dock? Let the following obituary notice tell:

"Mr. James Taylor, of Birkenhead, who was for nearly forty years one of the leading contractors for the Admiralty and other Government Departments, died on the 12th inst. A native of Glasgow, where he was born in 1817, he became connected with Fox, Henderson & Company, London and Birmingham, and in 1852 established the Britannia Engineering Works at Cheadle. He was the inventor of the floating graving dock, and the inventor and builder of some of the largest steam cranes in the kingdom." —*Scottish American*, September, 26th, '94.

THE SCREW PROPELLER.

Who was the inventor of the screw propeller for

steamers? In *The Leisure Hour*, London, for 1856, p. 532, is an interesting articles entitled, *An Accident and Its Results*, in which the invention is credited, it seems, wholly to Mr. Francis Pettit Smith, a farmer of Middlesex, England, in 1836. Now the truth is, as shown in the Encylopedia Britannica, that two Frenchmen—Bouguer in 1746, and Bernouilli in 1751 had invented it. When James Watt sent drawings of his engines to Soho in 1770 for Mr. Boulton to construct one for experiment, and had been told that it was intended to make an engine to draw canal boats, Watt wrote, "Have you ever considered a spiral oar for that purpose, or are you for two wheels?" and to make his meaning clear he sketched a rough but graphic outline of a screw-propeller.

Then in 1776 James Watt again mentions it, to Dr. Small, who replies that he had seen it. J. Stevens in 1804 was the first in America who tried it with steam, which he did at New York. Since the beginning of the present century hundreds of patents have been taken out for the invention. Mr. Robert Wilson, a Scot, was early in the field as a successful experimentalist with it. He made and exhibited models of a vessel propelled by a screw in the years 1821–1825. In the year 1827 he brought his scheme before the Admiralty; but it was rejected. From 1828 till 1832 Mr. Wilson brought his invention before various public bodies. Small grants were made by the Highland Society and the Society of Arts, for testing its efficiency; and its performance in a boat, at Leith, under the direction of a committee of the Society of Arts, was favourably reported in 1832. Says the Encyclopedia: "Mr. Bennett Woodcraft, Mr. Wilson,

and others have contributed greatly to the introduction of the screw propeller; but Mr. Smith, aided by his moneyed associates, was first to put the screw into a big ship, and boldly go to sea in her; and the world will continue to give him credit for introducing the screw propeller into actual use, and sometimes, but with less justice, for having invented it."

Who invented the centre board, to make a vessel lie near the wind? Benjamin Franklin, who in his works, written about 1770, describes it, tells us that the inventor was "Mr. W. Brodie, shipmaster in Leith."

FIRST TRANSATLANTIC STEAMER.

Who first sent a steamer across the Atlantic by the power of steam alone? We say by steam power alone, because, says *The Scientific American*, of Dec. 21, 1895. "To America belongs the glory of building the pioneer transatlantic steamship. This was the steamer Savannah, built at New York." A picture is given of this vessel; and behold, it is a three-masted, full-rigged ship, with eleven sails all spread, and quite sufficient to propel the vessel without steam at all, and which they actually did during eight days out of twenty-six, in the voyage to St. Petersburg in 1819–1820. *The Scientific American* has, however, the justice to add, that, "Next to the Savannah comes the Royal William, which it is said was the first sea-going steamer that ever crossed the ocean propelled all the way by steam." But why speak of it so uncertainly? It is a well-known, historic fact, connected with the city of Quebec, as *The Scientific American* has to acknowledge. Here are a few of the

facts showing Scotland's share in what our *Scientific American* friend would call "the glory" of it.

Mr. William Power, of Kingston, Canada, (says the *Woodstock Times*, January 17, 1890) claims that he saw, in the course of construction the first steamer that ever crossed the Atlantic by steam alone. She was built at Quebec. James Gouldie, now of Chicago, was intrusted to carry out the plans of construction given him at Greenock. He proceeded to Quebec in 1830, and there built the Royal William, named in honor of King William IV. She was launched in May 1832, and ran between Quebec and Halifax. In August of 1833, she crossed the Atlantic in twenty-five days. Mr. Gouldie, the builder, was born at Quebec, December 19, 1809. His father was a Scotchman; was at that time the most extensive ship builder and owner of his day; and during the wars of 1813 and 1815, he built in several places, for the British Government, quite a number of vessels of both large and small tonnage."

Who owns the lines of magnificent steamers that ply between Britian, the United States, and Canada? Almost, if not all, Scotchmen. The Anchor Line, by the Hendersons, of Glasgow. The Allan Line by the Canadian Ocean Steam Ship Company, the leading spirit of which is Hugh Allen, a Scot, to whom a complimentary dinner was given in 1856, at Quebec, by the chief members of the mercantile community of both lower and upper Canada. Then there is the Cunard Line, concerning which Mark Twain wrote a few years ago, a characteristic article entitled, "Origin and Queer Ways, etc., of a Pioneer Steam Ship company." He says: "It is a curious, self-

possessed, old-fashioned company, the Cunard. (Scotchmen they are.) It was born before the days of steamships. It inaugurated steamer lines: it never has lost more than one vessel: it has never lost a a passenger's life at all: its ships are never insured: great mercantile firms do not insure their goods sent over in Cunard ships: it is rather safer to be in their vessels than on shore." Then Mark Twain tells us why all this safety is secured, and why the line is called the Cunard line. He says: "Before adopting a new thing, the chiefs cogitate and cogitate and cogitate; then they lay it before their head purveyor, their head merchant, their head builder, their head engineer; and all the captains in the service, and *they* go off and cogitate about a year; then if the new wrinkle is approved, it is adopted, and put into the regulations." "It takes them about ten or fifteen years to manufacture a captain." "The noted Cunard Company is composed simply of two or three grandchildren who have stepped into the shoes of two or three children who stepped into the shoes of a couple of old Scotch fathers; for Burns and Mac Ivor were the company when it was born . . . it is Burns and Mac Ivor still in the third generation. Burns was a Glasgow merchant, Mac Ivor was an old sea-dog who sailed a ship for him in early times. Burns and Mac Ivor and Judge Haliburton ("Sam Slick") fell to considering a scheme of getting a job to carry the mails. They needed faster vessels. Haliburton had a relative who was not a shining success in practical life, but had an inventive head, named Sam Cunard; he took an old jackknife and a shingle and whittled

out this enormous Royal Mail line of vessels that we call the Cunarders—a great navy it is—doing business in every ocean; owning forty-five steamships of vast cost." "It has servants by hundreds of thousands." "In its own private establishment in Liverpool it keeps 4,000 men under pay." Says the *Scottish American* of October 8, 1890. "The life of Sir George Burns, one of the founders of the Cunard Company, has just been published by Hodder and Stoughton, London, and will be read with interest by Scotchmen in all parts of the world. Besides describing the business career of the brothers Burns, the author devotes a considerable amount of attention to George's philanthropic and charitable works. In his youth he was a friend and co-worker with Dr. Chalmers, but he early became an Episcopalian of the evangelical school, and in his later years he maintained an Episcopalian chapel at his residence at Wemys bay."

The *Hongkong Daily Press* tells of a novel wager made between two captains of steamers trading in that port; one was a Scotchman, the other an American. The Scot bet twenty-five dollars and a bottle of Champagne that five out of every six of the engineers on steamers were Scots. Both captains tested six steamers, and the Scotch captain won the bet.

SCOTCH ENGINEERS.

Before leaving steam let us inquire,

Who invented the sixty-ton steam derrick crane? The *Scottish American* of June 21, 1883, says: "D. J. Dunlap & Co., ship builders and engineers, Port Glas-

gow, are about to take a 'new departure' in connexion with the mechanical appliances for facilitating the work of lifting heavy boilers, engines, etc., on board of vessels which they have occasion to fit out before leaving the Inch Works, where they have been built. They were first invented by Mr. David Henderson, whose brother was one of the contractors for the Crystal Palace, in which the Hyde Park Exhibition of 1851 was held, and where they were first used in lifting the iron girders, etc., required for that building." It should also be noted that what is called "the steam crane' was invented by R. W. Thomson, of Edinburgh; also traction engine wheels—for common roads—of vulcanized India rubber. He was the inventor of "the steam omnibus," which has not, however, been a popular success. But although some Scotchmen may fail, as other geniuses do, in their projects, they are for the most part successful. As McFarlane says, "The Scotch inventions have mostly been of a real practical character, and have been universally adopted by all nations."

NEW YORK ELEVATED RAILROADS.

As another instance of Scotch engineering skill we may briefly notice that of Mr. John Baird, a native of Kirkintilloch, Dumbartonshire, who died in New York in 1891. He was superintending engineer of the Cromwell line of steamers running between New York and New Orleans. He spent twenty years in that service, and acquired a wide reputation both as a marine architect and as the designer of all kinds of engineering undertakings. It was from his plans and under his personal superintendence that the Second

Avenue and Sixth Avenue Elevated Railroads of New York were constructed, he being at the time vice-president and executive officer of the Metropolitan Elevated Railroad Company. He was a true Scot. A member of the St. Andrew's Society for many years, and was frequently a participant in the society's celebrations of St. Andrew's day." (*Scottish American*). Another instance is that of James Ferguson, a native of Ayr, 1808, who wrote extensively on the subject of civil engineering, correcting certain errors in it; and was general superintendent of the Crystal Palace of Sydenham, England.

CHAPTER VIII.

The thistle being a very locomotive plant we have already noticed its tendency to travel by steamer and railway; let us now see how it gets over the world by other means.

BALLOONS.

Who invented the balloon? Surely sober-minded Scotchmen would never think of such a thing! But they did. They made the first balloon, and made the first ascension in a balloon, in Britain.

Frederick Whymper, in *Good Words* says, that "Dr. Black of Edinburgh taught his students in 1766 that hydrogen in a thin bag would rise to the ceiling. He provided the bladder of a calf for the purpose, and his experiment failed; he did not repeat it, and may therefore be said to have missed a great discovery." Now Dr. Whymper is mistaken or telling what is not true, as the following may show. It is taken from a book entitled, *Up in the Clouds* or *Balloon Voyages;* being Vol. XII. of Ballantyne's Miscellany. London, James Nesbit & Company, 1864.

"The germ of the invention of the balloon lies in the discovery of Mr. Cavendeth, made in 1766, that hydrogen gas, called inflammable air, is at least seven times lighter than atmospheric air." Founding on

this fact Dr. Black, of Edinburgh, proved by experiments that a very thin bag filled with gas would rise to the ceiling of the room. In Dr. Thomson's History of Chemistry an anecdote related by Mr. Benjamin Bell, refers to this, as follows: "Soon after the appearance of Cavendeth's paper on hydrogen gas, in which he made an approximation to the specific gravity of that body, showing that it was at least ten times lighter than common air, Dr. Black invited a party of friends to supper informing them that he had a curiosity to show them. Dr. Hutton, Mr. Clerk, of Eldin, and Sir George Clerk, of Pennycuick, were of the number. When the company invited had arrived he took them into a room where he had the allantois of a calf filled with hydrogen gas; and upon setting it at liberty it immediately ascended and adhered to the ceiling. The phenomenon, they thought, was easily accounted for; it was taken for granted that a small black thread had been attached to the allantois; that the thread passed through the ceiling; and that some one in the apartment above by pulling the thread elevated it to the ceiling and kept it in its position. This explanation was so plausible that it was agreed to by the whole company; though like other plausible theories it turned out wholly fallacious, for when the allantois was brought down, no thread whatever was found attached to it. Dr. Black explained the cause of the ascent, to his admiring friends; but such was his carelessness of his own reputation that he never gave the least account of this curious experiment even to his class; and several years elapsed before the obvious property of hydrogen gas was applied to the elevation of balloons."

THE FIRST AERIAL VOYAGES MADE IN GREAT BRITAIN.

The credit of the first aerial voyage made in Great Britain has usually been given to Vincenzo Lunardi, an Italian. There is ground for believing, however, that the first balloon voyage was performed by a Scotchman, as the following extract from Chambers's Book of Days will show.

"It is generally supposed that Lunardi was the first person who ascended by means of a balloon in Great Britain; but he certainly was not. A very poor man named James Tytler, who then lived in Edinburgh, supporting himself and family in the humblest style of garret or cottage life by the exercise of his pen, had this honour. He had effected an ascent on the 27th of August, 1784, just nineteen days previous to Lunardi's."

THE KITE.

The Kite (or draigon, as it is called in Scotland) has in various forms become a useful instrument in scientific research in the departments of meteorology and aerial navigation. Who first used the kite for such a purpose? The American is apt to reply that it was Benjamin Franklin, who, in 1752, used the kite to demonstrate that lightning was electricity: and now, in May 27, 1897, the papers tell us that, "By the use of kites the Weather Bureau at Washington expects to be soon able to forecast the weather with greater accuracy and for a longer period." But Scotland long ago practically anticipated all such experiments, and even that of Franklin, by three or four years. For Lt. Hugh D. Wise, U. S. A., in the

Century magazine for May, 1897, says, that in 1749 Dr. Alexander Wilson and Mr. Thomas Melville, in Scotland, used it for taking the temperature of the upper air, and the kite, hitherto a useless toy, thus showed possibilities of becoming a useful and scientific apparatus."

THE BICYCLE.

Who invented the bicycle, that useful, speedy, pleasurable little vehicle which is now "all the rage" throughout the civilized world? Says the *Scottish American*, October 11, 1883: "Considerable discussion has taken place of late, both in the newspapers of this and of the old country, as to who was the inventor of the bicycle. The honour is really worth fighting for.

"Then who was he? We are glad to be able to say that there is no doubt he was (like Watt, and a host of the world's other benefactors) a Scotchman. Many years before that little Frenchman, Pierre Lallement, in 1864, made a bicycle in Paris, one had been made in Scotland. Nearly twenty years before that, the bicycle had been the wonder of the day there. Writing to a correspondent of the *Bicycle News*, Mr. Thomas Brown, of Lesmahagow, claims the honour of the invention as due to the late Mr. Gavin Dalzell, merchant, Lesmahagow, Lanarkshire, and says: 'It is a fact, established incontrovertibly by written proof, that so far back as the summer of 1846, at the very latest, he (Galvin Dalzell) had a bicycle of his own invention in almost daily use. And, according to the oral evidence of many people, and also to a statement made in a paragraph pub-

lished in a newspaper widely circulated in the Upper Ward of Lanarkshire, and which was not contradicted, his bicycle had been constructed several years before 1846.' And that 'prior to his invention of the bicycle he had invented a tricycle, the propulsion of which was effected by its rider in a way both ingenious and unique.' "

There is, however, another Scottish claimant for the invention. Let antiquarians decide between them. "An interesting exhibition of horseless carriages," says the *Scottish American*, May 27, 1896, "was opened with civic pomp and ceremony at the Crystal Palace, London, on the 2nd inst., and an exhibition illustrative of the evolution of the modern bicycle has also been got together. What is commonly believed to be the first bicycle ever made as distinguished from the old hobby horse is on view. It dates back to 1840, was made by Kirkpatrick Macmillan, and is lent by Mr. T. McCall, Kilmarnock, an old apprentice of Macmillan, who made many of these machines in the later '40's and early '50s. The exhibit has a portrait of the inventor attached to the machine with the following inscription. 'Kirkpatrick Macmillan, inventor, builder, and rider of the first bicyle. Year 1839.' "

Following this exhibition, the papers announce a suggestion that "a monument be erected in Dumfries, Scotland, to Kirkpatrick Macmillan, the now acknowledged inventor of the bicycle." *Scottish American*, November 17, 1896, and *Scientific American*, July 25, 1896.

But who invented the pneumatic tire for bicycles? Let the following portion of a long article in the

journal named *Black and White*, quoted in full in the *Scottish American*, May 19, 1897, tell:

ON THE TIRE.

Interview with Mr. J. B. Dunlop.

"The Dunlop pneumatic tire is one of the things you must have heard of, whether you cycle or not. Cyclists, it is believed, when they are in a reverent spirit, bless the name of Dunlop, and think with pity of those whose cycling days were over before the inventor of the pneumatic tires beamed upon a grateful world. In order, therefore, to gratify everybody, a representative of *Black and White* took advantage of a visit of Mr. J. B. Dunlop to London to ask him about the invention which has made his name famous all the world over. He had just received a telegram from his agent in Dublin, announcing the successful issue of a lawsuit in which he was interested, but had not taken the trouble to read the account of it in the papers; the telegram was quite enough for him.

"'You are not an Irishman, Mr. Dunlop, though you live in Ireland?' 'No, no,' said Mr. Dunlop, 'I am a Scotsman.' The question was indeed unnecessary; for you can always tell a Scot, and Mr. Dunlop is a powerful one. 'I was born in Ayrshire in '40, and I own a freehold there that has belonged to our family two or three centuries.'

"'You'll be returning some day to rebuild the family mansion?' 'Hoot no,' said Mr. Dunlop, with a smile.

"'You have not been always interested in cycles?'

'I was a veterinary surgeon, and had retired from my profession before I ever thought of cycles. I studied and won my degree in Edinburgh, and then went to the north of Ireland, where I have been ever since.'

"'You would not have much time for inventions?' 'I wouldn't say that,' Mr. Dunlop remarked, quietly. 'I always took an interest in things outside my profession, though I had a very large business. I used to pay over £300 a year for rent and kept two qualified assistants, thirteen horse shoers, and three hostlers. In connection with my profession I invented some things which helped me very much. I invented, for example, new frost cogs for sharpening horses that came to be known as the 'Irish Pattern,' and long before the germ theory was understood in relation to wounds I had invented and used an antiseptic for wounds that came to be known among the people as the 'Magic Water.' These things helped me very considerably. Many years ago I read a paper on the germ theory and antiseptics. I have also read papers on meteorology, on the science and theory of music, and on charms and superstitions in connection with diseases, etc.'"

Mr. Dunlop then describes the process of his invention, and how "at last he hit upon compressed air, cloth, and rubber, as the most durable, flexible, and light."

THE BICYCLE SKATE.

The Edinburgh *Weekly Scotsman*, of August 2, 1897, says:

"A considerable time ago Mr. Anderson, of Princes

street, Edinburgh, completed the construction of a bicycle skate, and at the time considerable attention was given to the invention. After the interest first awakened had died out, we heard nothing more of the bicycle skate, till now the Americans have taken it up. In the last number of the *Chicago Tribune* that has reached us there is a long description of a trial given to the skates in New York by Mr. Earl Reynolds of Chicago, amateur champion skater of the United States.

"The skates are the logical outcome of applying the bicycle idea to the old roller skate. They consist of a curved plate of thin metal ending in a fork at each end. In each of these forks is fitted a small bicycle wheel. The foot rests in the depression of the metal curve about two inches above the ground, and the wheels which are six inches in diameter, project in front of and behind the foot. This arrangement affords great stability, and one can walk with ease on them.

"At the close of his exhibition Mr. Reynolds said:

"'The rival and perhaps supplanter of the bicycle is here at last. I am an expert on the wheel and I love it, but I tell you this road skating is far better. In the first place there is little danger of a fall or accident of any kind. You can go over the roughest roads with ease at a remarkable rate of speed. If you want to go across country to some point of interest, wade across a brook, or even climb a cliff, you can do it and take your skates with you.'"

A NEW WHEEL—1898.

"Of all recent inventions having reference to loco-

motion that of the pneumatic tire is perhaps the most important, and in the very few years since its introduction it has brought large fortunes to many. What may possibly be a serious rival to it in its application to vehicles other than cycles has just been patented by Mr. Peter Fyfe, chief sanitary inspector of Glasgow. Mr. Fyfe's experiments were with a view to reduce the vibration communicated by an ordinary wheel to vehicles as well as to the horse attached to such vehicles. This has resulted in the invention of what he terms a pneumatic sleeve, which is made in one piece and drawn tightly over the axle-box. The wheel is pushed on to this rubber sleeve and then secured by steel bands. The sleeve, which is cellular in structure, is then pumped full of air to a pressure of about thirty-five pounds to the square inch. These cells are, as at present designed, four in number; and after charging with air each one can be isolated from the other by the turning of some small screws. By this arrangement the axle and axle-box are floated, and do not touch the nave of the wheel. Careful tests show that seventy-seven per cent. of the shocks which, under ordinary conditions, would be transmitted to the vehicle are taken up by this cushion of air and then dissipated. Three vehicles of different types have been fitted with pneumatic sleeves to their wheels, and careful diagrams taken by means of attached apparatus, the results being considered by experts as highly satisfactory. By fitting the pneumatic cushion to the middle of the wheel instead of to its periphery it will at once be seen that puncturing in the ordinary sense of the word is quite out of the question. The reduction in the amount of rubber

necessary in the manufacture, as compared to the pneumatic tire, points, it would seem, to a great saving in cost of material."

GEOLOGY.

Which nation has done most for the advancement of geological science? I think we may safely say Scotland. We can at least claim some of the most eminent names which the scientific world has hitherto honoured for their researches, discoveries, and writings in this department. Such as Hugh Miller, Hutton, Lyell, Murchison, Sir Archibald Geikie, Director-General of the Geological Survey in Britain, and others of less note. In 1892, when Sir Archibald was president of the British Association for the Advancement of Science, he, in the course of his opening address claimed for Edinburgh the honour of being the birthplace of geology as a science properly so-called.

CHAPTER IX.

MILITARY AFFAIRS.

If war, and bravery, and victory in war are influential in promoting the world's enlightenment and civilization, then Scotland has contributed her fair share. As good illustrations of that fact I cannot do better then quote:

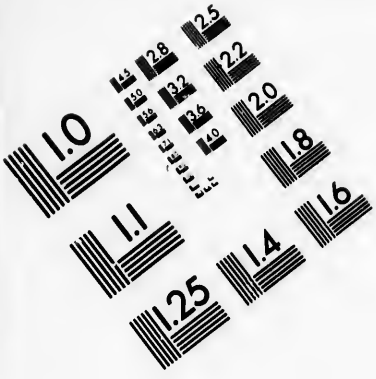
"The following extract from an amusing speech delivered recently by Mr. A. McKenzie in the New Brunswick Legislature which contains many capital points, and will be relished by our Highland readers. Referring to a proposition that the Agricultural report would be printed in the French language, Mr. McKenzie said that members of the House would do well to ask if there is no other language that deserves attention, since lecturers show, or attempt to show, that without the shadow of a doubt the Highlanders of Scotland are descended from the house of Israel, and it cannot be denied that the Celtic people gave its present lustre to Britain's glory. Who, I would ask, gave the prophesied colonies to Britain? Who wrested our country from the grasp of the French and vested it in the British Crown? Who scaled the heights of Quebec; and what music first proclaimed to Wolfe that victory perched on the British banner? It was the sweet music that was never tuned to a retreat. Who drove the French

from the Egyptian trenches? 'Twas they who understood the command—*Clan na Gael, gualain ri gualain!* Can we forget the charge at Waterloo, when the Highlanders took hold of the stirrups of the Endiskillen Dragoons and Scots Greys, and with the shout, 'Scotland forever!' relieved the Iron Duke of the wish for night or Blucher? That shout told the Man of Destiny that his fate was sealed, and that his country was no longer for him. Who drove the myriads of Sepoys before them? 'Twas Campbell's undaunted brigade; and though the seventy-eighth Highlanders, perhaps, under Havelock saved India, they being of the McKenzie clan I therefore withhold what might be their proper meed of praise for obvious reasons! Who scaled Alma's Heights? Was it not the Highland brigade? Who are they who scorned to receive the Cossacks in square? That thin red line, sir; the Highland Brigade. Who entered the fort at Sebastopol when their allies were repulsed, and who prevented the Russians from retaking the Balaklava? It was the Highland Brigade! Still later in the Ashantee and other wars, we have the Highlanders adding lustre to Britain's arms. But, wanting the Highlanders, we find in wars where they drew not the sabre and charged not with the bayonet, that Britain's martial glory was dimmed; and looking back over the vista of the years, we remember when Britain was of small account and that she became 'Great' only when Scotland joined her. Wherever the English tongue prevails a Scotch name is found to honour the head of the administration. Thus a Grant ruled in the neighbouring Republic and has given way only to a Hayes—'the Douglas and the Hay.' An-

other instance is found in our own dominion, but my modesty again forbids that I should dwell on that part of the subject. The manifest destiny of the English is that they shall predominate, because of their association with the Scotch, and if any language is [illegible] particularly fostered it is that of those who gave and preserved these colonies to the British Crown. We, as Scotsmen, however, do not ask for legislative enactments, nor do we beg for subsidies to maintain our language, for it is a gem to be displayed only on great occasions, and it is fitting only for the expression of great things. The English language is destined to be the language of the world—the language of the commerce—and where there is a Frenchman who aspires to honour and enlightenment, though he may not attain to Gaelic, he will learn English. I was surprised awhile ago to hear an honourable member say the Scotch was no language. It was a language before the French or English was ever thought of, and that gentleman, himself a Celt, should feel no pride in arguing against the language of his remote forefathers in favour of another and an alien tongue. To the victors belong the spoils. The British were the victors in this country, and those who accepted the conqueror's protection, and the free citizenship they now enjoy under the British flag, should also accept the English language."

"The sweet music" of the bagpipe, "which was never tuned to a retreat," is evidently now coming prominently to the front where some folk will be astonished to find it; for thus, we read, in the Toronto *Mail and Empire*, of October 12, 1896.

"Bagpipes are becoming a fashionable instrument



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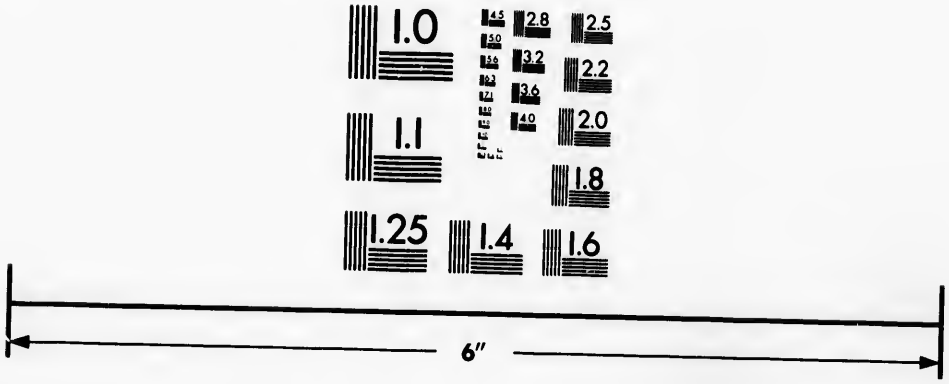

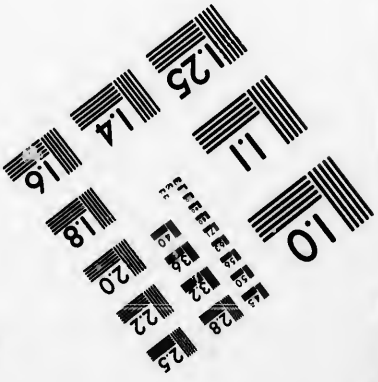

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for ladies in British drawing-rooms, Lady Elspeth Campbell, the Duke of Argyle's granddaughter, who is a skilled performer, having introduced the fashion. The pipes for parlour use are richly decorated and specially toned."

Then in the same paper, of the following month, November 28, comes the following item:

"Orders have recently been received from the colonel of a French regiment for Scotch bagpipes, the intention being to introduce pipe bands into the French army."

Some people, however, cannot appreciate the Scotch bagpipes; in fact they are accustomed to utter some very disparaging remarks anent them. Their dislike, however, may arise from a defect in their musical taste or cultivation; or from their not having those memorable historical associations with the pipes which are awakened in the minds of Highlanders especially by pibroch music. Moreover they may never have heard a full band of pipers such as Highland regiments have, and therefore have had no opportunity of comparing good pipe music with that of the brass band. As illustrative of how much the music of the pipes may be depreciated by some listeners and how highly appreciated by others, the following episode may here be related, with the needed explanation for some readers, that, in the German language, a common name for the bagpipe is *dudelsack*.

BAGPIPES ARE MUSICAL.

Views of Mr. John Johnson.

"A decision by a Milwaukee jury some time ago

in which it was decided that the Scotch bagpipe is a doodle-sack which 'emitted an unearthly noise,' and upon which a verdict of $150 damages was rendered the owner of a horse that became frightened at doodle-sack music, ran away, and was killed, has attracted attention all over the country. Newspapers from Maine to Mexico have taken the matter up and commented thereon, in both a light and serious vein, and in some instances advantage has been taken of Milwaukee's large German population to precipitate a war between Scotia and the Vaterland. Mr. John Johnston was asked by a local newspaper to come to the rescue of the instrument so popular in his native land, and delivered himself as follows:

"'Is it not rather late to interview me on the doodle-sack question? I am not a German scholar but I am told that the doodle-sack means wind-bag, and as the greatest orators as well as the finest singers have been called wind-bags it is not surprising the soul-stirring bagpipe should be classed in the same category. Strictly speaking they are all doodle-sacks. I have a much greater respect for that horse which ran away at the sound of the bagpipes than for the Court who decided it was not music. The horse understood that such inspiring strains called for corresponding action, and that no inane jog-trot was equal to the occasion. He, therefore, ran away, which was the best thing he could do under the circumstances. Had he been in the ranks of the Scots' Greys at Waterloo or Balaclava he would have charged the ranks of the enemy.

"'There is music, and music. If music be wanted in the parlour to sooth you or put you to sleep, then

the bagpipes should not be selected. Neither, for that matter, should a big drum and a brass horn. When it comes to putting every drop of blood in your veins in a tingle so that you have got to move whether you will or not, let the bagpipes or the fife and drum be called forth. Let a brass band take one street and a dozen bagpipes, or fifes and drums the other street and the brass band will hardly have a follower.

"'It is said of Shon Maclean, the duke's own piper:—

"'Like the whistling of birds, like the humming of bees,
Like the sough of the south wind in the trees,
Like the singing of angels, the playing of shams
Like the ocean itself, with its storms and its calms,
Were the pipes of Shon when he strutted and blew,
A cock whose crowing creation knew.'

"'Of course the bagpipes at their best must be heard amid the hills and glens of their own land, or at the head of a Scottish regiment at Bannockburn or Lucknow.

"'Was it not a ludicrous spectacle—the bagpipes on trial before a Milwaukee justice of the peace?

"'The New England poet, Whittier, had some appreciation of the wondrous power of the pipes giving out at one time the wild MacGregor's clan call, sharp and shrill, like swords at strife, and again the sweet and home-like strain of 'Auld Lang Syne.' That poet in his 'Relief of Lucknow' says:—

"'Pipes of the misty moorland,
Voice of the glens and hills,
The droning of the torrent,
And the treble of the rills,

Not the braes of broom and heather,
Nor the mountains dark with rain,
Nor maiden bower, nor borden tower,
Have heard your sweetest strain.

. . . . .

Sweet sounds the ancient pibroch
Over mountain, loch, and glade,
But the sweetest of all music
The pipes at Lucknow played.'

"'The great American poet thought the pipes at Lucknow gave out the sweetest of all music.'"

Who suggested the establishment of stationary libraries in every barracks of the British army—one of the greatest boons to military men, for their mental and moral improvement? It was Dr. Thomas Lightbody a Glasgow physician.

MILITARY FIREARMS.

Who invented the percussion cap for firearms, which is the parent of the needle-gun, and of all the modern cartridges? It was the Rev. John Forsyth, of Belhelvie, Aberdeenshire.

Who invented the safe handling of big guns during firing in ships and forts? Let the following tell:

"The Moncrieff gun-carriage—the action of which is on the same principle as that of a rocking-horse—has recently been tried in England with twelve-ton guns, and is found to answer as well as with guns of lighter weight. It was asserted that however applicable the principle might be to light pieces, it would not do for heavy seige guns; but the trials have shown this view to be incorrect. By the Moncrieff system, guns and men are out of sight, and below the

level of the parapet while loading, and only visible during the short time occupied in firing,"

Who is Henry of the Henry Martini rifle? Alexander Henry of Edinburgh. In the early part of 1852 he produced the first three-grooved shallow segmental butt rifle, with six and a half feet spiral, which was afterwards adopted as the British service arm, and known as the Henry Martini rifle, so long celebrated at home and abroad.

And who is Lee of the Lee Straight-Pull rifle? We get the answer from the well-known, intelligent, and versatile writer, Kit; at present engaged at Tampa, W. I., as war correspondent for the Toronto *Mail and Empire*. She says in that paper (June 11, 1898):

"Still Mars has the field, and he is great, and I love the 'hot wind of his breath.' The sound of the firing is good to hear, and almost every morning I go to listen to the crack of the Krag-Jorgensen and the Lee Straight-Pull. Lee, the father of magazine rifles, is by the way, a Scotchman, who emigrated to Galt, Ontario, and lived there till the breaking out of the American Civil War, when he went over to the states with some of his 'infernal' inventions, and is now, I believe, at Hartford, Conn., which place is the great factory of small-arms, being the home of the Colt, the Winchester, and others. Lee was twenty-eight when he left Galt for the war in the sixties. The Lee Straight-Pull has been adopted in connexion with the Krag-Jorgensen by the Government for the army, and is giving great satisfaction. Many prefer it to the Krag-Jorgensen, whose caliber, thirty, gives the bullet great velocity. The bullet is so light, however, that it is affected by the wind, while the rapidity

with which it revolves causes it to drift sideways, necessitating, in shooting at distances above 500 yards, an allowance of from five to fifteen feet to the side of the target."

A NAVAL HERO.

There is a name among those of brave, skilful, and successful heroes in naval warfare, which ought to be better known and appreciated among Scottish readers. I refer to Lord Dundonald.

The Toronto *Mail and Empire* of May 2, 1896, in a review of Albert R. J. F. Hassard's Life of Lord Dundonald, recently published, says:

"Thomas Cochrane, the future Lord Cochrane and tenth Earl of Dundonald, the greatest of modern commanders, the establisher of England's pre-eminence on the seas, the maker of distant nations, the hero of the most splendid naval engagements of this century, was born in a humble home in Aunsfield, Lanarkshire, in Scotland, on the 14th of December, 1775. At the age of eighteen his father consented to his beginning life as a seaman; and in 1793 he embarked on his first voyage on the ship 'Hind,' at Sheerness. Then began that stormy career, which after many adversities, many calamities, and many complications, terminated sixty-seven years afterwards, when, after having by his genius given to England the undisputed sovereignty of the ocean, and having left the traces of his nautical ability deeply graven on the armaments of more than one foreign nation; after having reared against himself formidable conspiracies, which were never overthrown until they were conquered by death; after

LORD DUNDONALD.

having created more personal enemies than the greatest public character of his time, yet living until all of his personal enemies had become friends; after having gained and lost and again gained distinctions as a reward of his ability, disease dragged him down to a mature death, and he was accorded, with the applause of his entire generation, the distinguished honour of interment in Westminster Abbey, to repose in that sepulchre as an evidence of the gratitude with which England remembers the men who made her great."

To the foregoing may be added, that the Whig administration under Earl Grey, 1831, believing him to be the victim of a cruel and unjust persecution, hastened to restore him to his naval rank. In 1847 Queen Victoria conferred on him the Grand Cross of the Bath. On his retirement from active service he devoted himself to scientific inventions—poop and signal lights, and naval projectiles. He declared himself in possession of a means of annihilating an enemy's fleet; and during the Russian war, offered to destroy Sebastopol in a few hours with perfect safety to the assailants; his plans, however, were rejected. He died, October 31, 1860, while holding the rank of Rear Admiral of the United Kingdom.

CHAPTER X.

But let us return to the Arts of Peace.

Who invented the moulds from which the raised type for the blind is cast? It was Thomas Mitchel, a native of Edinburgh, who died in Brooklyn, N. Y., July, 1892, aged 54. (*Scottish American*, July 6, 1892.)

But the blind, throughout the world, have been further benefitted, we might say enlightened, by another Scot, as is shown by the following clipping from a Glasgow paper of 1861, and copied the same year in the *Montreal Witness:*

DEATH OF AN INGENIOUS BLIND MAN.

"We readily insert the following from a correspondent:

"On Friday, 22nd February, William Laing died at No. 62 Weaver Street. He was born in Bothwell, in the year 1805, and was an outmate of the Glasgow Asylum for the Blind for upwards of 30 years. About twenty-five years ago he made an improvement on the arithmetical board for the blind, which enables them to perform, with great accuracy and facility, calculations in any department of arithmetic; and so excellent is the method of teaching by this board that it has been adopted by all the institutions for the blind in this country, and even in those of

America. Yet, although his improvement was of such importance in enabling the blind to obtain the advantage of this branch of education, thanks was the only reward he ever received. His death is much lamented by all his friends and associates, who knew the worth of the pure and rational pleasure they enjoyed in his company." To the foregoing I must add that William Laing must have been a genius of no ordinary character, for his friends in Canada inform me that he also contrived and constructed "an orrery of considerable dimensions"—an astronomical machine for exhibiting and illustrating (to the blind, I presume) the various movements of the planetary system.

STEREOTYPE.

The world's enlightenment is greatly indebted to the cheapness of books and magazines, and the cheapness is indebted to stereotype; for when the types of a book have once been set up, and an impression taken of them in type metal, no further setting up of type is required for future editions.

Who invented stereotype? William Ged of Edinburgh, a jeweller, in 1735.

Who invented postage-stamps which we stick on letters and papers? Let the following tell:

INVENTION OF POSTAGE-STAMPS.

The postage-stamp will celebrate its fiftieth anniversary this year. The invention is due to printer James Chalmers, of Dundee, who died in 1853, and who finally, with his system, the adhesive postage-stamp, conquered the whole civilized world.

England, fifty years ago, introduced the postage-stamp, and according to a decree of December 21, 1839, issued the first stamps for public use on May 6, 1840. A year later they were introduced in the United States of North America and Switzerland, and again a few years later, in Bavaria, Belgium and France. One of the most important and valuable collections of postage-stamps is in the German Imperial Post Office Museum, which contains over 10,000 postage-stamps and other postal delivery devices.—*American Notes and Queries.*

Who gave the first circulating library to the world? It was Allan Ramsay, author of "*The Gentle Shepherd.*" The *Leisure Hour* for 1861, p. 421, says:

"The first circulating library in London was established about 1740. The Edinburgh circulating library, founded in 1725, by the celebrated Allan Ramsay, is the oldest institution of the kind in Britain."

MECHANICS' INSTITUTES.

Who gave Mechanics' Institutes to the world? It was the Andersonian University of Glasgow. Here was established what was called an "anti-toga class"; that is, a class which did not wear the college "toga" or gown. It was intended chiefly for manufacturers and the higher class of mechanics. But the fee of one guinea and the hour for meeting proved at last a hindrance to its success. The fee was then abolished, a suitable hour for meeting was appointed on Saturday evenings, and all mechanics who desired instruction were invited to attend. Dr. Birkbeck, a Yorkshire man, educated in Edinburgh was entrusted with

the class. The first evening the attendance was seventy-five, next evening, 200, and the next after, 500. Birkbeck, two or three years afterwards, 1804, went to London, and in 1821, under Lord Brougham's powerful advocacy, he established a similar institution there and others throughout England. One Claxton attempted to found a similar institution in London, but failed. He wrote a little work illustrated with a wood-cut of a tinsmith's shop in Glasgow as the birthplace of Mechanics' Institutes. His reason for selecting so humble a birthplace was simply this, that Birkbeck was accustomed to go there and instruct the tinsmith how to make or mend philosophical instruments for the Institute. Birkbeck's biographer says that "Glasgow was unquestionably the first place where a genuine and enduring Mechanics' Institute was established."

But who was Anderson? All working men, and especially Scotchmen ought to honour his memory, Here is what Beeton says of him: "John Anderson, one of the earliest promoters of scientific instruction among the working class and the founder of the Glasgow Andersonian Institution. Born at Roseneath, Dumbarton, 1721, died in Glasgow, 1796. It was by Anderson that the plan was devised of sending, by gas-inflated paper balloons, newspapers and other communications from France into Germany when all other means of conveyance were intercepted by a cordon of troops between the countries."

FREEMASONRY.

Freemasonry is said to be of great antiquity, and to be greatly influential in promoting the world's enlight-

enment and civilization. Its high antiquity, dating as it does at least from the building of King Solomon's Temple, precludes the idea of its being of Scottish origin. Yet, judging by what its writers are pleased to make known to us, Scotland must have had in ages past a foremost part both in its preservation and dissemination throughout the world. In McKey's Lexicon of Freemasonry we are told that the ancient and accepted Scottish rite of thirty-three degrees is "next to the York rite, perhaps the most extensively diffused throughout the Masonic world." David Murray Lyon, in the Preface to his magnificent volume, "The History of the Lodge of Edinburgh," declares that "Scotland possesses the oldest authentic Masonic records known to exist." Similar testimony from an English source is given in a small but very learned and sensible volume, entitled "The History and Illustration of Free Masonry, compiled from an Ancient Publication." It is dedicated, by permission, to the worshipful master, officers, and brethren of the Lodge of Unity, number 214, Ringwood, Hants; and published by Baldwin, Cradock, and Joy; and G. B. Whittaker, Ave Maria Lane, London, 1826. In various parts of the book the author refers to the building of Kilwinning Abbey, Scotland, by Free Masons in the year 1140, and to the ancient lodge of Kilwinning whose records go "as far back as to the end of the fifteenth century." At p. 58, he says, "The principles of the (Masonic) order were even imported into Scotland, where they continued, for many ages, in their primitive simplicity, long after they had been extinguished in the continental king-

doms. In this manner, Scotland became the centre from which these principles again issued, to illuminate, not only the nations on the continent, but every civilized portion of the habitable globe." In proof of these statements the author refers the reader to the year 1140, in the Statistical Account of Scotland, Vol. XI, Parish of Kilwinning; or Edinburgh *Magazine* for April, 1802, p. 243.

Who originated the British Women's Temperance Association? Let the following obituary notice of November, 1896, tell:

DEATH OF A WELL-KNOWN LADY TEMPERANCE ORGANIZER.

"Mrs. Margaret E. Parker, who for many years had taken a leading part in the temperance movement amongst women, died in Dundee on Sunday the 8th inst. The deceased lady had the distinction of being the founder of the British Woman's Temperance Association. She was the first president. Since the time of her election the association has steadily progressed, until at the present time it has a membership of upwards of 100,000. The present president, it may be mentioned, is Lady Henry Somerset. As long ago as 1877 Mrs. Parker was elected president of the International Temperance Union at the World's Convention in America, and only recently she returned from California, where she had delivered many lectures and organized a large number of temperance societies. She was well known in Dundee as an energetic worker and a forcible speaker. She was seventy-four years of age."

THE Y. M. C. A.

Where and by whom did Young Men's Christian Associations originate? England claims something of the kind in 1844, but Scotland claims the true origin twenty years before that date, namely, in 1823. Here are the facts of the case.

The *Encyclopedia of Missions*, published by Funk & Wagnals, New York, says that young men's mutual improvement societies have existed in almost every age of the church, yet they seemingly were nearly, if not altogether extinct, when David Nasmyth, a native of Glasgow, between 1823 and 1838, formed seventy young men's societies in as many cities of the United kingdoms, and in France, and America. As the oldest, the present Glasgow association, traces its origin to a Nasmyth society, formed in 1824; so also may be traced the associations elsewhere either directly or indirectly to the same source. The honour of the development of the associations, as we now see them, is due, however, to George Williams of London, who in June 6th, 1844, formed them into a union of world-wide extent. David Nasmyth was, nevertheless, the pioneer of this influential union for the temporal and spiritual welfare of young men throughout the world.

CITY MISSIONS.

And who originated *City Missions*, in modern times, those widespread and efficient means of reaching and rescuing the morally depraved, poor and outcast of our large cities? It was David Nasmyth. After he had established the city mission

DAVID NASMYTH.

in Glasgow, Dublin, and other Irish towns, and in the City of New York, he was encouraged by a few Irish ladies to go to England and begin the good work in the slums of London. The magazine called *Good Words*, for 1891, tells how the young Scotchman, a stranger in the great city, in the year 1835, at first called upon the Bishop of London and the most prominent ministers of the leading dissenting bodies, appealing to them to co-operate with him and with each other in his grand design. But his appeals were without success. He was told in effect that in the then state of religious feeling it was most unlikely that such a person as he should ever succeed in carrying out so gigantic a scheme. But they knew not their man. He found two or three humble men, like himself, in faith, zeal, and courage, and the London City Mission, though small, was an acomplished fact. It grew, and flourished, and has now, in London, five hundred missionaries, whose influence for good among thieves, black legs, fallen women, and ruffians in London's dens of iniquity no human mind can estimate. These missionaries not infrequently insulted and maltreated have, while following Nasmyth's example, often risked their lives by going where no policeman would dare to go unaccompanied. Let the following bare outline of their work in London during the past year (1890) give some idea of their extensive usefulness. They paid 3,600,000 visits or calls; distributed 5,000,000 tracts; read to 844,000 people portions of the Scriptures; reclaimed 2,500 drunkards; and induced 5,500 people to attend church, and as many children to attend Sunday-school. All that in one year! Who then

can estimate the work and the results of the London City Mission during the fifty years of its existence, or since David Nasmyth began it? Add to all this the past fifty years' similar work and results of the City Missions, not only in London, but also in Glasgow, Dublin, New York and in other centres of great population, then we may well say that the sum of David Nasmyth's influence for good reflects honour on the country which gave him birth, and is another illustration of Scotland's share in enlightening and civilizing the world.

BOYS' BRIGADES.

Who has not heard, at least in the British Isles, of the Boys Brigade? The same volume of *Good Words* tells us all about it. It is the missing link between the Sunday-school and such societies as Church Guilds, Young Men's Christian Associations, Willing Workers, etc. Professor H. Drummond calls it "a very great invention." Its object is to gather boys of a certain age, say between twelve and fifteen years; not only the street arabs, the waifs, and gamins, but also boys of a better class who refuse to attend Sunday-school, and have got beyond parental control, and are acquiring vicious habits. In the Brigade the boys are dressed and drilled like soldiers. They are not taught the art of war, but self-respect, reverence for superiors, order, obedience, Christian truth, and manliness. Where did the Brigade begin? and who invented it? It began in Glasgow: and its inventor was William A. Smith a genuine Scotchman of that city. It began in 1883 or 1884, with one company, three officers, and thirty boys, Now (in 1890) it has

overrun Britain and Ireland, having 433 companies, 1,370 officers, and 18,052 boys; besides seven companies in the United States, three in Canada, and one in South Africa. Who can imagine the amount of good the Brigade has done during the past eight years in rescuing boys from vice, crime, and moral ruin?

FIRE BRIGADES.

Who has been the great organizer and driller of the modern fire companies or brigades? Mr. Braidwood, a native of Edinburgh; a man combining genius, caution, and great personal courage. In 1824 he entered the police force in Edinburgh and organized a regular fire brigade. In 1832 he published a pamphlet on "the causes and means of extinguishing fires," which gave him more than local celebrity, and led to his removal to London, where he did good work until his melancholy death in discharge of his duty.

It is a mark of good intellect to attend to small as well as great things. Scotland has done so in her inventions.

Who invented watches? Says the *Church Herald*, February 24, 1870:

"The invention of watches had preceded by a few years, that of small clocks. Our ideas of a primitive watch are always associated with a turnip; but it was not until the seventeenth century, when Graham, the Scotchman, invented the cylindrical escapement, that watches assumed this respectable but inconvenient shape. Popular tradition ascribes the invention of watches to Peter Hele, of Nurenberg, in the year

1490. But then it is a notorious fact that King Robert, of Scotland, possessed one, so far back as the year 1310, *i. e.*, 180 years earlier. The only way in which we can account for this discrepancy, says the *Herald*, is by the supposition that watches were originally invented by a Scotchman, but that the maker died suddenly without promulgating his secret. It is but just to notice, that Graham, the great horologist, although having a very Scotch name, is said by Beeton to have been born in Cumberland.

Who invented the kaleidoscope? Sir David Brewster of Edinburgh in 1814, and perfected it in 1817.

Who invented the stereoscope? Haydn says that the "the first was constructed and exhibited by Professor Charles Wheatstone in 1838." Beeton, with more justice, says: "The question whether or not Sir David Brewster was the *discoverer* of the stereoscope has given rise to considerable controversy, that honour being also claimed by Professor Wheatstone." One thing is certain, Brewster, by using lenses, instead of Wheatstone's mirrors, has made the instrument the popular thing we now have.

Sir David Brewster; inquiring into the history of the stereoscope, finds that its fundamental principle was well known even to Euclid; that it was distinctly described by Galen 1,500 years ago; and that Giambatista Porta had in 1599 given such a complete drawing of the two separate pictures as seen by each eye, and of the combined picture placed between them, that we recognize in it not only the principle, but the construction of the stereoscope.

CHAPTER XI.

ELECTRICITY.

Electricity has become a prominent element in modern civilization. Let us see what share Scotland has had in the matter.

Who invented what is called the Voltaic pile or battery? It gets its name from Alessandro Volta, of Como. Volta was, indeed, an inventor of the battery; but not the only, and certainly not the first inventor of it. For, in the year 1793, after Galvani's discoveries, "Many publications followed" says the Ency. Brit. Diss. vi, Ed. 8th, p. 963; "one of which by Dr. Fowler of Edinburgh, (afterwards of Salisbury) is remarkable as containing a letter by Professor John Robison, who first thought of increasing the effect of heterogeneous contact by using *a number of pieces of zinc made of the size of a shilling making them up into a rouleau with as many shillings.* We have here, says the Encyclopedia, unquestionably the first idea of the pile, which moreover was actually constructed. This was in May, 1793," whereas, "the date of Volta's discovery of the principle of the pile appears to be August, 1796"—that is, three years after Professor Robison of Edinburgh had already discovered it. *Ibid*, p. 964.

THE TELEGRAPH.

Who invented the electric telegraph? Of course there are several claimants. There are different forms of the telegraph; but the chief part of the invention is the transmission of thought to a distance by means of electricity. There are as claimants: Levi Burrell, Milwaukee, 1827; Francis Ronalds, England, 1823; Le Sage, in France, 1744. Gauss and Weber in 1833 or 1834; Wheatstone and Morse in about 1837. But the true inventor lived, and published his invention at least twenty years before the earliest of these claimants; and he was a Scot. His claim to the original invention is admitted by all true scientists. The following from the Toronto *Globe* of January 20, 1857, tells the story; and cannot well be abridged on account of the importance of the subject. The introductory letter of inquiry is evidently from the pen of our late Brother Scot, and most general writer, the Rev. Mr. McGeorge, editor of the *Streetsville Review*, and known all over Canada and elsewhere as "Solomon."

ANTICIPATION OF THE ELECTRIC TELEGRAPH.

To the Editor of the Globe.

"Sir:—In an interesting article in Saturday's *Globe*, you mention that a writer in "Notes and Queries" alludes to a communication in the *Scot's Magazine* dated Renfrew, February 1, 1753, in which the author, who merely indicates himself by the initials 'C. M.,' not merely 'suggests electricity as a medium for conveying messages and signals, but details with singular minuteness the method of opening and maintaining lingual communication between remote

points, a method which, with only a few improvements, has now been so eminently successful.' And you add—'Should any of our friends chance to be possessed of the *Scot's Magazine* referred to in the immediately preceding paragraph, we should like to be furnished with a copy of C. M.'s paper. It would be singular enough to be certiorated that the method of discovering the electric telegraph, is due to a denizen of the West of Scotland.'

"The letter you allude to is republished in the *North British Review* for February, 1855, and fully justifies the claim set up on behalf of the writer, that the Electric Telegraph, perhaps the greatest marvel of the present age, was really discovered by a Scotchman more than a century ago, although for reasons which cannot now be ascertained, the discovery was allowed to lie dormant till a much later period. The letter is entitled, "An Expeditious Method of Conveying Intelligence," and is as follows:

"RENFREW, Feb. 1, 1753.

"SIR.—It is well known to all who are conversant in electrical experiments, that the electrical power may be propagated along a small wire from one place to another without being sensibly abated by the length of its progress. Let, then, a set of wires equal in number to the letters of the alphabet be extended horizontally between two given places parallel to one another, and each of them about an inch distant from that next to it. At every twenty yards' end let them be fixed on glass with jewelers' cement to some firm body, both to prevent them from touching the earth, or any other non-electric, and from breaking by their own gravity. Let the electric gun-

barrel be placed at right angles with the extremities of the wires, and about an inch below them. Also, let the wires be fixed in a solid piece of glass six inches from the end, and let all that part of them which reaches from the glass to the machine have sufficient spring and stiffness to recover its situation after being brought in contact with the barrel. Close by the supporting glass, let a ball be suspended from every wire, and about a sixth or an eighth of an inch below the balls; place the letters of the alphabet marked on bits of paper, or any other substance that may be light enough to rise to the electrified ball, and at the same time let it be so contrived that each of them may reassume its proper place when dropped. All things constructed as above, and the minute previously fixed, I begin the conversation with my distant friend in this manner. Having set the electrical machine going as in ordinary experiments, suppose I am to pronounce the word *Sir*, with a piece of glass or any other *electric per se*. I strike the wire *S* so as to bring it in contact with the barrel, then *i*, then *r*, all in the same way; and my correspondent almost in the same instant observes those several characters rise in order to the electrified balls at his end of the wires. Thus I spell away as long as I think fit, and my correspondent, for the sake of memory, writes the characters as they rise, and may join and read them afterwards as often as he inclines. Upon a signal given or from choice I stop the machine, and taking up the pen in my turn, I write down at the other end whatever my friend strikes out.

"If anybody should think this way tiresome, let him, instead of the balls, suspend a range of bells

from the roof equal in number to the letters of the alphabet, gradually decreasing in size from the bell A to bell Z, and from the horizontal wire let there be another set reaching to the several bells, one viz., from the horizontal wire A to the bell A, another from the horizontal wire B to the bell B, etc. Then let him who begins the discourse bring the wire in contact with the barrel as before, and the electrical spark working on bells of different sizes, will inform the correspondent by the sound what wires have been touched, and thus by some practice they may come to understand the language of the chimes in whole words, without being put to the trouble of noting down every letter.

"The same thing may be otherwise effected. Let the balls be suspended over the characters as before, but instead of bringing the ends of the horizontal wires in contact with the barrel, let a second set reach from the electrified cask (barrel) so as to be in contact with the horizontal ones; and let it be so contrived at the same time, that any of them may be removed from its corresponding horizontal by the slightest touch, and may bring itself again in contact when left at liberty. This may be done by the help of a small spring and slider, or twenty other methods, which the least ingenuity will discover. In this way the characters will always adhere to the balls excepting when any one of the secondaries is removed from contact with its horizontal, and then the letter at the other end of the horizontal will immediately drop from its ball. But I mention this only by way of variety.

"Some may perhaps think that, although the elec-

tric fire has not been observed to diminish sensibly in its progress through any length of wire that has been tried hitherto, yet, as that has never exceeded thirty or forty yards, it may be readily supposed that in a far greater length it would be remarkably diminished and probably would be entirely drained off in a few miles by the surrounding air. To prevent the objection, and save longer argument, lay over the wires from one end to the other with a thin cont of jeweler's cement. This may be done for a trifle of additional expense; and, as it is an *electric per se*, will effectually secure any part of the wire from mixing with the atmosphere.

"I am, &c. 'C. M.'"

"The ingenious Renfrew man is, beyond a doubt, the true inventor of the electric telegraph and the Morse and House telegraphs now in operation are merely improvements on his idea, better adapting it to the commercial and social requirements of the age. A telegraph, constructed in precise conformity with C. M.'s instructions, would be found to convey intelligence certainly and expeditiously, although not equal in value for practical purposes to some of the modern improvements. But one almost regrets that for the beautiful chime of bells, conveying the thoughts of the distant correspondent, described by C. M. in his second paragraph, should be substituted the monotonous and unideal 'click, click,' which constitute the only vocal utterances of our telegraph of the present day."

ED.

C. M.'s letter attracted the attention of Sir David Brewster, and in the life of that eminent scientist there is an explanation of how the identity of C. M.

was discovered. From this it appears that the writer of the letter was Charles Morrison, a native of Greenock, who had been bred a surgeon, but was understood to be connected with the tobacco trade in Glasgow. He was known to be able to transmit messages along wires by means of electricity, and his neighbours at Renfrew regarded him as a sort of a wizard. Mr. Morrison, it is added, was obliged, or found it convenient, to leave Renfrew, and settle in Virginia, where he died.

It is a matter of surprise to some who know the history of the telegraph that Morse should be regarded as its inventor, and that a monument ascribing that honour to him should be proposed to be erected to him at Washington. A strong protest by some American writer appeared in the public prints some time ago, against that proposal; and seemingly with justice, not only from what has now been adduced concerning the Renfrew man, but also from other considerations. For instance, the *Popular Science Monthly*, for June, 1880, says: "The name of Professor Henry of Princeton, N. J. is not among those who are associated in the popular mind with the electric telegraph, and yet without his discoveries the electro-magneto telegraph could not exist." "Professor Taylor, who was for many years connected with the Patent office, states 'that the work for which Morse gets the credit is, in all its more important features, the work of another man, Alfred Vail, who, with Dr. Gale, was associated with Morse in perfecting the invention. The Morse alphabet and the instrument that was found in practice to work were both the sole inventions of Mr. Vail.' No Henry, no Morse telegraph."

In the Toronto *Mail and Empire* of May 22, 1897, is the following notice of astounding sub-marine telegraphic achievement.

"Guglielmo Marconi, a young Italian student, twenty-three years of age, is now at Cardiff, in Wales, fixing electrical communication with Weston super-Mare across the Bristol Channel, by means of the new telegraphy without wires, of which he is the inventor. Twelve months ago this electrical genius went to England with his discovery, and gave a practical exhibition of its possibilities at Salisbury, in Wiltshire, by holding conversation between two points seven miles apart without a wire. The electrical waves utilized to transmit the signals require no wires, cables, nor metallic strips as a conducting path, and brook the restraint of no intervening obstacles. They penetrate right through walls of stone and steel, through hills and houses, they pursue a direct course from leaving the transmitter until reaching the receiver, and by means of the ordinary Morse telegraphic alphabet tell the message they bear. In the opinion of experts, Marconi has made a discovery worthy of this great century, and wrested from nature a priceless secret.

But Scotland was able to do the same thing more than thirty years before Marconi was born; as the following question and answer may prove:

Who first discovered the electric light and invented the submarine telegraph? Let the Toronto *Globe* already mentioned, tell. (January 26, 1857.)

A TRANSMARINE TELEGRAPH, AND ELECTRIC LIGHT.

"In the same article in the *North British*, is an illu-

sion to an interesting telegraphic project, which has another ingenious Scotchman for its author.

"'A new principle of telegraphic communication if it shall prove of practical value, may render such an enterprise [an Americo-European Telegraph] within the reach even of the western states of Europe. The idea of what may provisionally be called a transmarine telegraph has been recently brought forward by Mr. Lindsay of Dundee. This plan is to send the electric current through great distances of water by means of long lines of wire, stretching along the opposite shores. These lines communicate with a powerful battery, and their four terminations dip into the sea, so that the electric currents flow in two different directions across the ocean. Mr. Lindsay has made experiment on a small scale in Scotland, which so far confirmed his views; but he repeated them on a larger scale last summer at Portsmouth, where he sent messages through a mile of water, though there were many ships in the intervening space, and many of them with coppered bottoms. In this experiment the length of the lateral wires were less than half a mile. We understand that a patent has been secured by a Company who intend in the spring to make experiments on a great scale.'

"The idea of a *trans* marine telegraph suggested itself to Mr. Lindsay a number of years ago. I had the pleasure of spending an evening with him in the autumn of 1845, when a large portion of the conversation turned on this very scheme. Only a day or two before he had made his first successful experiment, in transmitting electricity across a sheet of water in the neighborhood of Dundee, without the

use of a connecting wire, and he was then very sanguine as to the practicability of a transmarine telegraph across the English channel—the idea of telegraphic communication not having been mooted at that period. But, until the paragraph quoted above from the *North British Review* came under my notice, I had supposed that in the multiplicity of other avocations, Mr. Lindsay had discontinued his telegraphic experiments. The hours he could spare from his fatiguing duties as teacher in the Dundee Gaol, were devoted to the Herculean task of preparing a polyglot dictionary of *fifty* languages, with all of which he had made himself more or less acquainted. I believe he is the only individual in Great Britain who possesses a copy of the whole works of Confucius in the original Chinese, and more than that is able to read them. A second copy is in the British Museum, but not, it is said, in any private library. He was at the same time engaged in an interesting experiment, having for its object to ascertain the degree of instruction of which convicts who had grown up in vice and ignorance were capable. Some of these while serving their term of imprisonment in Dundee Gaol, Mr. Lindsay succeeded in initiating into the mysteries of the Integral and Differential Calculus, and qualified them for working out some of the most difficult calculations embodied yearly in the Nautical Almanac. He was occupied also with a controversy, in which he claimed that he was the first discoverer of Electric Light, having had his house lighted up with it for years, and of this he brought forward such cogent proofs as finally silenced the rival claimants of the distinction. With so much

on his hands, it is not surprising, although it may be a matter of regret, that he has not found time to prosecute his scheme of a transmarine telegraph, with the energy which its importance demands if it is really practicable as the experiments so far seem to indicate that it is. If you or any of your correspondents can supply any information as to what became of the projected company, who were 'to make experiments on a great scale,' it would be in a high degree interesting." Yours, etc.,

SCOTUS.

Toronto, January 22, 1857.

CHAPTER XII.

WHO WAS THE CABLE KING?

SIR JOHN PENDER.

"Sir John Pender, whose death at the age of 80 years we recently announced, was widely known as

'the Cable King.' When the project for laying the first Atlantic cable was originated he was one of the 345 subscribers who contributed £1,000 each towards the undertaking. But that was only an earnest of the faith he had in the success of ocean telegraphy. The time came when there was a financial crisis. After the breaking of the first cable the Gutta Percha Company hesitated about the making of another without a very substantial guarantee. It was then, as has been said, then Sir John Pender's genius rose to heroism. 'What amount of guarantee do you require?' he asked; and the answer being a quarter of a million sterling, he said, 'Will you take my personal guarantee for that amount?' 'Yes.' 'Well, you have it,' he replied, and the bargain was closed. After seeing the Atlantic cable successfully established Sir John devoted himself sedulously to the organization and development of cables in the Mediterranean, and to India, China, Australia, South Africa, and elsewhere, the result being the construction of a world system, of which the American cable is now but a segment. Born in the Vale of Leven, not far from the birthplace of Tobias Smollett, he began life, after receiving an ordinary school education, by serving in the office of one of the print-works there. Thence he went to Glasgow, and gradually developed into a merchant of the typical Scotch kind. He also acquired large business interests in Manchester, and had made a fortune entitling him to retirement before the cable enterprises were ever entered on. He had a seat in Parliament off and on for considerably over thirty years, the greater part of the time as Member for the Wick Burghs." 1806.

THE EARTH CIRCUIT.

Who first discovered and demonstrated *the earth circuit* in connection with the electric telegraph? It was Alexander Bain, a Scot. The Encyclopedia says that "Mr. Steinheil, in 1838, more than suspected such a circuit," but from some cause or other it obtained little publicity. A most ingenius artist, Mr. Bain, *established for himself* the principle, and *proclaimed its application* somewhat later. And what was the result of its application? It reduced the double wire of the telegraph to one, the earth answering for the other.

The following obituary notice of Mr. Bain appeared in the *Scottish American Journal*, February 1, 1877:

"Mr. Alex. Bain, the electrician, has died in the new Home for Incurables, at Broomhill, Kirkintilloch. Mr. Bain was a native of Thurso, and was sixty-six years of age. He was the inventor of the electro-chemical printing telegraph, the electro-magnetic clock, and of perforated paper for automatic transmission of messages, and was author of a number of books and pamphlets relating to these subjects."

Who is acknowledged to be the prime projector and chief promoter of the telegraphic communication between Canada and the Australian Colonies, through the Pacific Ocean; and which, in connexion with the new fast Atlantic steamers, the Atlantic Cable between Ireland and Nova Scotia, and the Canadian Pacific Railway, is destined to revolutionize and vastly improve, in the near fu-

ture, the style and volume of intercolonial business, and at the same time afford a speedier and safer means of communication between Britain and her eastern and western dependencies in times of both peace and war? It is Mr. Sanford Fleming, born at Kirkaldy in Fifeshire. The Toronto *Empire* of March 21, 1894, says:

"Mr. Sanford Fleming, formerly engineer-in-chief to the Canadian Pacific Railway, must be credited with the principal share in the work of forming opinion upon this question. At the Colonial Conference of 1887 he advocated what was then a novel and rather startling idea. He has since that time been indefatigable in marshaling facts and arguments in support of schemes for bringing Canada and the Australian colonies into closer connection; and it was a memorandum drawn up by him that Mr. Mackenzie Bowell, in his tour last year through the Australian colonies, submitted to the different Governments as a definite basis of discussion."

THE TELEPHONE.

Who invented the electric telephone—that unspeakably useful instrument by which we can speak to our distant friends even many miles away, and which saves commercial and other people so much writing, time and tramping through our cities and towns? It was Alexander G. Bell, a Scot.

The following is his own description of the process of the invention, as quoted in the *Halton News*, October, 1883:

DISCOVERY OF THE TELEPHONE.

"Was the invention of the telephone the result of

a deliberate research and experiment for that purpose, or was it a discovery rather than a creation?

"It was the result of long and patient study of two distinct lines of thought which finally blended in one, producing the telephone. I had for a long time studied the subject of speech and the organs by which it is produced, as had my father before me, and in doing so conceived the idea of producing artificial sounds by a certain system. I came to Canada for my health, I am a native of Scotland, you know, and while studying electricity in the woods there, and on regaining my lost health I was called by the officials of the Boston schools to introduce a new system of teaching them to speak. I had long believed it possible to teach the deaf the use of the mouth and organs of speech, and had demonstrated it in some degree, and gladly accepted the opportunity of putting the system into practical operation. I undertook the work, keeping up, however, my study of electricity and its application to sound production, working late at night after other people were at rest. In the course of my efforts to demonstrate to the deaf how the sound waves affect the hearing ear I made use of a little instrument with a membranous diaphragm which responded to the sound waves. I conceived the idea of writing those sound waves on smoked glass so they might be read. Continuing the experiment still further, I obtained a human ear, and found by speaking into it I could produce similar but more satisfactory results, a little bone in the ear being moved by the vibration of the ear drum and writing the sound waves on the glass. All this time I was continuing my experiments with sound

and the application of electricity to its production. I had succeeded in a considerable degree, when suddenly the idea of connecting the two successful experiments occurred to me, and I did so, attaching the ear to the instrument by which the sounds were produced, and I had the telephone. The remainder was only a matter of detail. The two lines of thought and investigation which I had followed so long and patiently blended there, and the result was the telephone."

And who invented visible speech—that universal alphabet by which not only people who can see and hear, but even the deaf and dumb, can pronounce any language and any dialect of the world? It was Andrew Melville Bell, father of the inventor of the telephone. (See *Scribner's Magazine* for October, 1892.)

THE RADIOPHONE.

Who invented the radiophone, one of the marvellous triumphs of modern science, by which human speech can be sent long distances through a ray of light instead of over an electrified wire? It was the same Scotch genius who invented the telephone—Professor Alexander Graham Bell.

THE FIRST ELECTRIC CAR.

"Who first attempted locomotion by electrical power? In the year 1830 Professor Salvatore da Negro, of Padua, produced, but on a very small scale, oscillating and rotary motion by means of electricity. Then followed a variety of experimenters and inventors, chiefly German, whose aim was the propulsion

of carriages by the same mysterious force, the most successful experiment being that of Siemens and Halske of Berlin in 1879. But about forty years before that date we find the following facts given in Pepper's Cyclopedia of Science simplified. He says: 'Davidson in 1837 placed an electro-magnetic locomotive on the Edinburgh and Glasgow Railway. The carriage was fifteen feet long, six feet broad, and weighed about five tons, with all the arrangements and apparatus on board for producing electricity, but when put in motion a speed of only four miles an hour could be obtained.' No wonder so heavy a carriage went so slowly as compared with the motor electric cars. It had no powerful primary dynamo on the roadside to supply and feed it with the electric motive power. It supplied its own electricity. The wonder is it went at all. But it did go, and was doubtless the forerunner of all the electric cars and carriages of the present day, and of the future ages while such vehicles continue to run.

"N. B.—The foregoing statements are of course subject to correction. Any earlier valid claim to the invention will be cheerfully acknowledged. Honour to whom honour is due."

COMPRESSED AIR MOTOR.

Who is the inventor of the air motor? The answer is given by the *Scottish American*, of September 16, 1896.

"Mr. Robert Hardie, inventor of the air motor which has been adopted on some of the road car lines in this city, and which is expected to bring about a revolution in the motive power for operating urban

and suburban railways, is a native of Edinburgh. He was born in 1846."

Other Scotch inventions might be noted, but let those already mentioned suffice to show that Scotland has had a large share in the mechanical and electrical devices of a practical kind, by which this age is distinguished.

We have lingered too long, perhaps, among Scotch materialities. Let us gradually ascend to something higher.

CHAPTER XIII.

SCOTCH PHYSIQUE AND OATMEAL.

Whence come the pluck, the energy, the intellectuality of the Scottish character? "A sound mind in a sound body" are undoubtedly requisites for such a character. Without a sound body, including a well-nourished brain and muscle, we cannot expect either physical or mental energy. Oats have had much to do with Scotch character. Many a bright Scotch genius has "cultivated literature on a little oatmeal," notwithstanding the disparaging joke of the Rev. Sydney Smith; and some of the greatest athletes in the world owe their muscular strength under God, to having been fed very much on the same simple, sensible, and most nutritious diet—oatmeal and milk. Says the *Scottish American Journal* of October 11, 1883: "There is what is termed the Anthropometric Committee of the British Association." From that committee's report we learn that the average height of Scotchmen is 68.61 inches, or nearly five feet, nine inches; of Irishmen 67.90 inches; of Englishmen 67.36 inches and of Welshmen 66.65 inches.

There are ninety men in the Scots Guards averaging six feet two and a half inches in height. Not one is under six feet, and twelve are six feet four inches. Toronto *Empire*, February 21, 1894.

Then the average weight of full-grown Scotchmen is 165.3 pounds; of Englishmen 155 pounds; of Irishmen 154.1 pounds. "Beef-eating Englishmen" says the Scotch editor, "had better turn to the halesome parritch, wale of Scotia's food." Yes, oatmeal and lively, pleasant, out-door games have had much to do in forming Scotch character. From whence have we the roarin', general winter game of curling and the most popular summer game of golf? Both from auld Scotia where they have been played during hundreds of years past.

During the last twenty years Scotland has had reason to be proud of her record in foot-ball matches against England, Wales, Ireland and Canada. Games played, forty-five; won, thirty-five. And in the recent great international game of "Tug o' war," between Americans, Irish, Danes, Germans, Italians and Canadians, "the Scotch were awarded the first prize, with six successive victories and no defeats." The oatmeal did it.

Well, that was the animal strength; but physiologists and chemists tell us that our brains require phosphorus, and that there is more of that substance in oatmeal than in any other kind of grain in common use.

"The average weight of a Scotchman's brain is sixty ounces, and Englishman's forty-nine, a Frenchman's a little over forty-five." *Scottish American Journal*, June 29, 1891.

It is not a matter of surprise, therefore, that Scotchmen should resemble their unicorn in having superior brain power, or rather a good organ for the exercise of mentality. But this mentality or intel-

lectuality must be properly instructed and influenced by Christian truth and the grace of God to produce the genuine Scottish character. All who know the history and character of the nation know that its

MORAL AND INTELLECTUAL CHARACTER IS DUE TO THE CHRISTIAN RELIGION.

It is said that Christianity was introduced A. D. 201, in the reign of Donald I. We know for certain that St. Ninian laboured as a Missionary in Galloway in the fourth century, and built the famous stone church called Candida Casa. In one of the windows of the venerable cathedral of Glasgow, is a picture of St. Mungo bidding welcome to the famous Irish Missionary, St. Columba, who made Iona the headquarters of his missionary operations in the sixth century. But this mission of Columba was the result of St. Patrick having carried the Christian faith from Scotland to Ireland about a hundred years before Columba was born. Provided that St. Patrick was a Scot, we find that the Scottish people were early under the influence of the Christian religion and ever since showed their zeal in building expensive places of worship. We find the Scottish army, at Bannockburn in 1314, down on their knees in prayer, before the battle.

And when John Knox, that good, honest, fearless man, arrived in Scotland (himself a Scot), he found the people in religious zeal and intelligence, ready to co-operate with him in the reformation of religion, of which there was great need at the time. By the establishment of parish schools, he greatly in-

creased the secular and religious knowledge of the kingdom. If his wise and patriotic plan of dividing the vast wealth of the church had been carried into effect, namely, one-third for the support of colleges

JOHN KNOX.

and schools, one-third for the support of the poor, and the remaining third for the support of the Christian ministry, both the schools and colleges of Scotland would have been richly endowed, her ministers

well supported, and her church fabrics, especially in rural districts, more in accordance with Christian decency and order. But Knox's patriotic plan was ridiculed, thwarted, and almost nullified by the land grabbing, tythe and rent grabbing nobility and gentry of the time. Knox himself says of them: "Some were licentious, some had greedily gripped the possessions of the church, and others thought that they would not lack their part of Christ's coat." (See Hetherington's History of the Church of Scotland, pp. 47, 50, 53.) Yet despite this wholesale plunder of church property by the avaricious reforming aristocracy and lairds, Knox's parish schools, and half-starved dominies, and pitifully endowed colleges have done wonders for the intellectual and moral condition of the Scottish people. That condition has in some respects been changed "for better or worse" during the past fifty or sixty years by the influx of other nationalities, and by other circumstances; but all that has hitherto been praiseworthy in the national character may be traced to the blessing of God on Bible training in the parish schools, the exposition of the Scriptures by lectures in the pulpit, and on the reverent reading of "the big ha' Bible" at home.

"While learning the art of reading, by the Book of Proverbs," says Dr. Guthrie, "we had our minds stored with the highest moral truths, and by sage advices applicable to all the ages and departments of life, the branch, while it was supple received a bent in a direction highly favourable to future well-doing and success in life. The patience, prudence, foresight and economy which used to characterize Scotch-

men—giving occasion to the saying, 'A canny Scot,' and by which they were so often able to rise in the world and distance all competitors in the race of life—was, to a large extent, due to their being thus ingrained in youth and childhood with the practica wisdom expressed in the Book of Proverbs."

Each of the leading religious bodies in Scotland—the Established, the Free, and the United Presbyterian, and the Episcopal—has its missionaries in foreign parts, altogether forming "a grand army" of workers for the world's evangelization. Then there is the National Bible Society of Scotland, which in 1891 disseminated outside of the empire, and in the colonies, 172,769 Bibles, 189,222 New Testaments, and 311,026 portions of the Scriptures.

EDUCATION.

Who introduced into England, Ireland, Scotland, and elsewhere, what is known as the Lancasterian system of instruction in public or national schools—known also as the monitorial, the Madras, and the Bell system? It was not Joseph Lancaster, good man, though he did a great work in propagating schools on this economic plan of mutual instruction; of which schools there have been at one time, "some hundreds of them in England, and in London more than forty." The honour of introducing them belongs to the Rev. Dr. Andrew Bell, a Scot, born at St. Andrews, in 1753. He was a clergyman of the English church, was in 1789 chaplain of Fort St. George, and minister of St. Mary's at Madras, and there in superintending the Military Orphan school he adopted from the native schools the monitorial system. Bee-

ton says, "Joseph Lancaster is often said to be the introducer of this system into England; but the merit is, we believe, due to Dr. Bell. He was rewarded for his exertions with a prebend's stall in Westminster Abbey, and the mastership of Sherburn Hospital, Durham. He amassed a large fortune, 100,000 pounds of which he left for the establishment of schools to be taught on the Madras system, and for other charitable purposes. He died at Cheltenham, June 27, 1832, his remains being brought to London, and interred in Westminster Abbey, with all the marks of distinction which his worth so well merited."

Who originated the London University, now University College? Let Beeton answer. Speaking of Thomas Campbell the poet he says, "He was twice elected to the rectorship of Glasgow University; and took an active part in forming the London University, now University College, which he indeed claimed the merit of originating." (See *Leisure Hour* for 1861, p. 560.)

Concerning Normal Schools Chambers's Encyclopedia says, "One of the earliest, if not the earliest Normal School in Great Britain was the Sessional School of Edinburgh (1830); afterwards developed into the General Assembly's National Institution; England followed with the Battersea Training College instituted by Rev. J. P. Kay Shuttleworth and Mr. Tuffnal, resulting in 36 Colleges for the training of teachers. Glasgow, however, lays claim to have had the first real Normal School in Britain. As to the Edinburgh Sessional School it was merely monitorial or Lancasterian; and as to when it developed into the Normal character is not stated. In favour of Glasgow's

claim we may well accept the testimony of so good and intelligent a man as David Stow, Esq., Honourary Secretary of the Glasgow Normal Seminary, and author of "Moral Training," "The Training System," etc. In his work entitled "Bible Training for Sabbath Schools and Week-day Schools" he says distinctly that "the Glasgow Normal Seminary was the first established in Great Britain." (Page 106, 7th Edition, Blackie & Son.)

WHAT SHARE HAS SCOTLAND IN THE MODERN NEWSPAPER?

The newspaper is now a great educator, both in truth and error; and is more read by the busy world than books. It is a mighty power in forming public opinion — shedding light and darkness; civilizing or demoralizing the world of readers. It is pleasing therefore to know that the newspaper is so much under the control of Scotch common sense and moral influence.

Every large city of Canada, and almost every large town has, or has had, its Scotch editor or editors. And as for the United States a well-known Journal of New York, speaking of pioneer journalists, says: "Newspaper men hailing from Scotland are to be found in nearly every city on this continent, and are everywhere regarded as among the most valuable among those workers who give to American journalism whatever literary ability it possesses to-day. In fact, if the theme were traced to its sources, as it might be, it would be found that Scotchmen have given to the Press of the United States even all the distinctive features on which it now prides itself

Even such a characteristically American device as display heads over important articles was introduced by a Scotchman in Philadelphia, and we are sorry to say it, another Scotchman, in Richmond, was the first to make a feature of that personal and sensational style of newspaper writing on which so many modern papers rely for their circulation and other patronage. If we wanted to show the services which our countrymen have rendered to American journalism we could point to hundreds of men who have adorned the highest walks of newspaper life." Among the illustrious journalistic pioneers of the United States mentioned are George Dawson, born at Falkirk in 1813, editor of the Rochester Democrat and Albany Evening Journal, James Tytler, a Forfarshire man, editor of the Salem, Massachusets, Register, from 1794 till his death 1804. He wrote the bulk of the first edition of the Encyclopedia Britannica. And still earlier John Campbell postmaster and stationer, editor of the Boston News Letter, issued in 1704, and which retained its vitality against all opposition until 1775. But we shall see more of Scottish Journalism when we come to speak of the Scot in India.

THE ROYAL SOCIETY.

Who was the prime mover in the formation of the famous Royal Society for the cultivation of science? It was Sir Robert Murray, (1600–1673) son of Sir Robert Murray of Craigie, Ayrshire. "He took a prominent part in the deliberations of the club in London, for the discussion of natural science, called 'The New Philosophy.'" He obtained a charter for the newly organized society: was its first President for

three years in succession; and during his life exerted great zeal in extending its influence. (Ency. Brit.) In Hamilton's Outlines of the History of England, C. XXVI, is the following record: "Charles II. was a great patron of learning, and at the suggestion of Sir Robert Moray, instituted the Royal Society for the cultivation of mathematical and physical research."

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

And who was it who originated the more modern and better known British Association for the advancement of Science? Let Vol. XIV., p. 277 of the last edition of the Encyclopedia Britannica tell. It says, "In an article in the *Quarterly Review*, Sir David Brewster threw out a suggestion for an 'Association of our nobility, clergy, gentry, and philosophers,' which was taken up by and found speedy realization in the 'British Association for the advancement of Science.' Its first meeting was held in York in 1831; and Brewster, along with Babbage and Herschel, had the chief part in shaping its constitution. . . . Besides his discoveries in optical science he was the inventor of the lenticular stereoscope now in use, instead of the cumbrous mirror instrument of Wheatstone, the kaleidoscope, and dioptric lighthouses, which preceded those of Freshnel; so that his successor, the head of Edinburgh University, paid a just tribute to his memory after his death — 'Every lighthouse that burns round the shores of the British Empire is a shining witness to the usefulness of Brewster's life.'"

A nation's character which is represented emblemat-

ically, in part, by the unicorn, and by the thistle with leaves and flower surrounded with prickles, may well be supposed to have somewhat of a logical and metaphysical style of thinking—to be observant, in fact, of very fine points, principles, and distinctions in abstract truth. And so it is with the cultivated Scotch character.

Who have been the most noted metaphysicians, in our day—the men who have explored the faculties and illustrated the operations of the human mind? Reid, Abercomby, Dugald Stewart, Brown, Sir William Hamilton, and George Paxton Young—all of them Scots, and whose fame as mental philosophers has spread far beyond braid Scotland.

In such a country we might expect some distinguished mathematicians. Scotland has produced a fair share of them: but as it is a science which, like others, does not show itself except in its results, we need only refer to the Scottish civil engineering, ship-building, and mechanical inventions, already mentioned, all of which required more or less the practical application of mathematical science, and which go to prove that Scotland is not behind other nations in that department of useful knowledge. Mathematics is of supreme importance in making astronomical calculations: and no nation has given more ease and comfort to calculating astronomers than Scotland.

Who invented Logarithms? It was Sir John Napier, baron of Merchiston, near Edinburgh, about the close of the sixteenth century. And what are logarithms? Laplace, the great French philosopher tells us, they are tables of figures, which, says he,

"by reducing to a few days the labour of many months, doubles, as it were, the life of an astronomer, besides freeing him from the errors and disgust inseparable from long calculations."

ASTRONOMY.

Scotland has not only given to astronomy the benefit of logarithms but has doubtless made good use of them in that sublime science; and has added to it other discoveries and inventions in promoting it. Thomas Dick, LL. D., "The Christian Philosopher," has studied and written largely on "The Solar System," and on astronomical instruments. Dr. Patrick Wilson, of Glasgow, a practical astronomer, was the first to discover that the sun is a dark body with a luminous atmosphere; and that what we call spots on the sun are merely openings in its photosphere. His discovery was published in an admirable paper in the *Philosophical Transactions* for 1774. It is to be regretted that Herschel, more than twenty years after, when writing on the same subject, did not more pointedly acknowledge his indebtedness to Wilson for the discovery. Dr. Gregory, another practical astronomer of Scotland, is celebrated as the inventor of the reflecting telescope—a most important invention. Dr. Gregory's reflecting telescopes are famous all over the astronomical world. But says Hayden, "The reflecting telescope was invented by Sir Isaac Newton in 1668." Others say, in 1671 or 1672. Yet the same Hayden is telling the honest truth when he states, "that Gregory invented the reflecting telescope in 1663; and, that, in that year he published his invention in a work entitled *Optica*

Promota, which spread his name all over Europe." The discrepancy is explained in this way,—Gregory although the real inventor, acknowledges that he had not the ability to construct the instrument, nor could he find an optician who understood how to do it; whereas Sir Isaac Newton, who was a practical mechanician, on Gregory's principle "made one with his own hands." (See Encyclopedia Britannica.)

Then we have James Ferguson, "The Peasant Boy Philosopher," who rose from being a shepherd boy to be a mechanician, a painter, and a high class astronomer, a Fellow of the Royal Society, and honoured by reading lectures on astronomy to King George III. We have also as an honour to our nation Professor Nichol of Glasgow, a most eminent astromoner who wrote largely on the science and "who was the first to make known to the public the nebular theory" of the formation of worlds. Other Scotch astronomers might be mentioned but let these suffice.

The unicorn's horn and the prickles of the thistle are seen cropping up also, mathematically, in more sublunary and humbler achievements than in those of astronomy. There, for example, is James Wyllie, "the Herd Laddie" who is the champion draught-player of the world; and there is Captain George Henry MacKenzie, an Aberdeenshire man, who is known as "the American Chess Champion."

CHAPTER XIV.

FINE ARTS.

If we knew nothing of Scotchmen except what we have noticed concerning their scientific discoveries their mechanical inventions, and their military and athletic exploits, we might well suppose that they were a very matter-of-fact set of fellows who cared little or nothing about the fine arts, music, poetry, painting, sculpture, and architecture. We forget that although the thistle has a rough exterior it has a warm, soft heart. The truth is the Scotch are naturally and even enthusiastically musical and poetical, and also artistic in other matters: but ever since the sixteenth century until about sixty years ago they have conscientiously, as a nation, believed, that it was unwarrantable and dangerous to employ the fine arts (except very simple music) in aid of religion. But in secular life the case has been different. Where can we find music that so thrills the heart of all nations as does that of Scotia? Let the following testimonies from outside sources tell:

"THE FOLK SONGS OF SCOTLAND."

"This was the subject of an interesting lecture, illustrated with vocal and instrumemtal music, which was delivered in Providence, R. I., last Friday by Mr. Louis C. Elson. The lecturer is an enthusiastic

admirer of Scotch music, in which he says every note in the gamut of the emotions is sounded. In this respect he contends the music of Scotland stands far above the music of every other country, and has inspired the composers of all nations. As reasons why Scottish music should be the subject of special study the speaker mentioned these: (1) Because of its great antiquity; (2) because the construction of its scales is so peculiar; (3) because it embodies the works of the great poets; (4) because of the history represented in it; and (5) because its influence on modern composers has been so great. *Scottish American*, October 28, 1891.

The following extract from some forgotten source shows how the "great composers" appreciate our national music:

SCOTCH MUSIC.

"In a collection arranged by Beethoven the Welsh tune 'Of a Noble Race was Shenkin,' the English 'Sally in our Alley,' and the Irish 'Last Rose of Summer,' are all included among Scotch music. This, if it be really the case, may perhaps be accounted for by the fact that Scotland had a civilized court of her own down to a late period; and that thus 'the products of the north country were naturally more largely interchanged with those of other European countries than could be the products of exclusive Wales, or of careless, harrassed Ireland.' Boiledieu has incorporated a few Scotch melodies in his opera, 'La Dame Blanche'—not unreasonably, seeing that the plot of the opera is mostly based on Sir Walter Scott's 'Monastery.' Similarly, 'Auld Lang

Syne' is worked in among the tunes in Niedermayer's 'Marie Stuart.' As a third example, Scottish melodies are worked into Mendelssohn's beautiful Scotch symphony."

"Mendelssohn in the Highlands.—*Scottish Society* says: How many people know that Mendelssohn once spent a month in the Highlands collecting bagpipe airs, particularly piobaireachd airs, which he made use of in some of his best compositions?" *Ross Journal*, August 27, 1897.

The music of Scotland comes from Scotland's warm poetic heart, a heart whose affections have been warmed and refined by the Christian religion, and thereby trained to appreciate and love "whatsoever is pure and lovely and of good report." Even if a Scotch poet were an infidel his best sentiments could be traced to the same sacred source. And to the same source we may trace

THE SCOTTISH VOICE.

If the Scottish voice is not the most beautiful in the world, says the *Pall Mall Gazette*, it has no rival except the French. But it is perhaps the most beautiful. The French are happier, but the Scottish loses nothing by that little appeal to the hearer—that slight wistfulness. The inflection makes it the cadence that—like some Georgian melodies—does not finish, as it were, on the keynote, but dips a little way and then it is suspended. What adds to all this charm is the little tone of education which the Scottish voice possesses in all ranks.

POETS AND SONGS.

Scotland abounds in poets. If, as has been said,

every seventh man in Paisley is a poet, it would evidently be an absurd task to take the whole country into account, and attempt to do more than merely notice some of their most popular songs and other productions without mentioning the authors' names

ROBERT BURNS.

Here is a mere swatch o' their sangs. "Were'na my heart licht I wad die, There's nae luck aboot the hoose, Mary weep no more for me, Flowers o' the Forest, And ye sal walk in silk attire. McGregor's gathering, O'er the Muir among the Heather, My ain Fireside, Auld Robin Gray, The Boatie rows. Wha'll be King but Charlie, The Laird o' Cockpen, Caller Herrin, Teribus and Teri Odin, Will ye no come back again? Cheer Boys, Cheer, Alister Mc-

Allister, Leezie Lyndsay, The Four Maries, The Braes o' Yarrow, Bird of the Wilderness, Annie Laurie, The Braes o' Balquidder, Tam Glen, The Maple Leaf Forever, Logan Braes, The Flower o' Dunblane, Jennies Bawbee, Auld Guidman ye're a Drucken Carle, Keen blaws the Win' o'er the Braes o' Gleniffer, Gloomy Winters noo awa', Let us go, Lassie, go, Bonnie Dundee, Oor Guidman cam hame at e'en, Scenes of Woe and Scenes of Pleasure, Jenny Dang the Weaver, Kelvin Grove, The Lass o' Gowrie, Bonny Kilmeny, Down the Burn Davie, Castles in the Air, When the Kye comes Hame, Scotland yet, Our Bugles Sang Truce, Wandering Willie, John Anderson my Jo, Afton Water, The Braes o' Ballochmyle, Comin through the Rye, Scots wha hae, O why left I my hame? My Love is but a Lassie yet, Auld Lang Syne, Maggie Lauder, This is no my ain hoose, Lochaber no more, The Blue Bells of Scotland, Farewell to Bonny Tiviotdale, Duncan Gray came here to woo, Rule Britannia, Ye Mariners of England, A Wet Sheet and a Flowing Sea, Ye Banks and Braes of Bonny Doon, The Land o' the Leal, My Nannie's awa, Of a' the airts the win can Blaw, Farewell to Fiunery, Tullochgorum, The Birks of Aberfeldy, The wee, wee German Lairdie, A wee Bird Cam to our ha' Door, Came ye by Athol, The Standard on the Braes o' Mar, Get up and Bar the Door, Mary of Arygle, Within a mile o' Edinburgh toun, Whistle o'er the lave o't." To this list of Scottish lyrics more could easily be added; but let these suffice to show what a rich medley of poetry, patriotism, pathos, and drollery lurks under the usually staid and grave exterior of the Scottish character. Many of these

songs are sung with high appreciation the wide world over wherever there is any knowledge of the Scottish language.

The powerful influence of Scotch song among different nationalities might here be illustrated by various incidents; but let the following, from the Toronto *Mail*, August 14, 1873, suffice:

"A touching incident is related of the Rev. Richard S. Storrs, the father of the Rev. Dr. Storrs, of Brooklyn. Recently the sixty-first anniversary of his settlement over the Congregational church of Braintree, Massachusetts, was celebrated. 'As the venerable pastor moved with feeble steps up the aisle, he was greeted with Auld Lange Syne on the organ. Overcome by the touching reception, the old man threw himself on the sofa and wept like a child.' Of all that were present at his settlement in 1811 no one remained to see the present anniversary."

Then we have many droll poems such as *Watty and Meg* by Sandy Wilson, the celebrated ornithologist; and *Tam o' Shanter* by Burns; and his *Cotter's Saturday Nicht*, in which he describes truly one o' thae scenes of hame religion.

> "From which auld Scotia's grandeur springs;
> Which makes her loved at home, revered abroad."

And, we hae sic weird, eerie, eldritch poems as Will Nicholson's *Brownie o' Blednoch*, ca'd Aiken Drumm; and sic heart-sair anes as Willie Laidlaw's *Lucy's Flittin*, and Willie Motherwell's *Jeanie Morrison*. Many an audience has been fairly melted to tears when a real Scotch elocutionist has recited to them Jeanie Morrison. But then he gave the true

pronunciation and intonations of the language. What a burning shame it is to our country and to our mither tongue, that, when sons or daughters of Scotch parents have acquired a smattering of German, French, or Italian, they will pique themselves on a correct pronunciation of these foreign languages; but when they come to sing a Scotch song or give a Scotch reading they cannot pronounce the braid Scotch because forsooth they think it is vulgar to do so! Our noble Queen does not think or do so. She delights in the sturdy, couthie language of auld Scotland. It is only the snobs, the shabby-genteel, the unpatriotic, or at least the uneducated Scotch folks who do not follow the Queen's example, but generally abandon their mother tongue for some of the worst pronunciations of what is usually called English.

We lately heard *Annie Laurie* sung in public, by a quartette, three of whom were of Scotch parentage; and how did they pronounce the refrain "I will lay me down and die," which ought, of course, to be pronounced *Lowrie*, I will lay me *doon* an' *dee*? They pronounced it as though it were all English—"down" rhyming with clown, and "die" rhyming with stye. Oh! it was enough to make a Scotchman hiss like a serpent at the traitorous murderers of their mother tongue, or to lay himsel' doon and dee in utter disgust. We have heard a highly educated clergyman, born in this country, of south or west of Ireland parentage, and who had never been in Scotland, recite *Watty and Meg* as correctly as if he were a native of Paisley, and had never been out of it. It was an honour to him, and a rebuke to any silly, snobbish, recreant

Scotch folks who were present. Scotchmen and Scotchwomen! Keep up your mither tongue at hame. It is a noble language. Professor Blackie, of Edinburgh, that true-hearted Scot, who is no ordinary judge of languages, well says of Scotch, that "It is the lyric dialect of the English language. It is to English what the Doric was to Greece, and Homer to Greek literature; and the greatest vulgarity he knows of is the affectation of gentility."

The following extract from *Scribner's Magazine*, (April 1895) tells how an intelligent outsider can appreciate our mother tongue:

"The Charm in Scotch Words.—I wonder if persons who can write Scotch are sufficiently aware of the great literary advantage they have over writers who are not born to that ability. It is no credit to them that they can do it, It is a gift of nature dropped in their lap. I never heard of any one who learned by artificial means to write Scotch. Scotch writers do it, and no one else. It has long been obvious that the proportion of good writers to the whole Scotch population was exceedingly large, but I do not remember that it has ever been pointed out how much easier for a Scotchman to be a good writer than another because of his innate command of the Scotch tongue. There are such delightful words in that language; words that sing on the printed page wherever their employer happens to drop them in; words that rustle; words that skirl, and words that clash and thump."

Scotland has given to the world a good share of other poetry besides songs. For example: *The Seasons*, by Thompson; *The Pleasures of Hope*, by Campbell; *The Gentle Shepherd*, by Ramsey; *The*

Course of Time, by Pollock; *The Sabbath*, by Graham; *Marmion*, by Scott; and *The Grave*, by Blair, But as for popular hymns; Scotland, as compared with England has not produced many.

HYMN WRITERS.

Horatius Bonar wrote, *Hymns of Faith and Hope*, including the following: A Few More Years shall Roll; I heard the Voice of Jesus say; I was a Wandering Sheep; I lay my Sins on Jesus; Thy way not Mine, O Lord.

James Montgomery wrote, Hail to the Lord's Anointed, Forever with the Lord. Go to dark Gethsemane; Lord teach us how to pray aright; and several others in common use.

William Knox, born 1789, and died at Edinburgh 1825, wrote two collections of sacred lyrics, named respectively "Songs of Israel," and "Harp of Zion." Two of his best productions are: "Acquaint Thee, O mortal! Acquaint Thee with God," and "Oh why should the Spirit of Mortal be proud?" The latter we are told, was a special favourite of Abraham Lincoln, president of the United States.

Mary Lundy Duncan, wrote, Jesus tender Shepherd.

"Where high the heavenly Temple stands," was written by Michael Bruce; and that favourite hymn, among children, There is a Happy Land, was written by Andrew Young an Edinburgh man.

But besides the hymns in English, Scotland has produced not a few, both ancient and modern, in the Gaelic language. The modern authors being such as Dougall Buchanan; Dr. MacGregor, Nova Scotia;

Dr. MacDonald, Ferintosh; Rev. Peter Grant of Strathspey; D. MacDougall of Barra, and John Morrison of Harris.

PROSE WRITERS.

The prose literature of Scotland has had much to do in enlightening and civilizing the world. We have already noticed some of its writers on science, but we must now, omitting a host of novelists and historians confine our attention simply to some of those works intended for the enlightenment of the general public. Dick, "the Christian Philosopher," wrote in popular style on Astronomy, The Future State, and The Improvement of Society. Dr. Chalmers wrote eloquently on the same subjects—sermons on astronomy, and the moral improvement of the masses in our cities. Rev. Dr. Henry Duncan wrote the Philosophy of the Seasons, and Dr. Adam Smith, in his *Wealth of Nations*, gave the first sensible ideas on political economy. Chambers's *Journal*, and Information for the People, and Black's Encyclopedia Britanica have led the general reading public into new and numerous fields of knowledge unknown to them before. Walter Besant says of Chambers's *Journal*, "It has now a circulation of 250,000; and if each copy represents a household, one-sixth of the inhabitants of England and Scotland read it.

Then Hugh Blair's lectures on rhetoric and belles-lettres, the Edinburgh *Review*, Blackwood's *Magazine*, and the intensely interesting *Noctes Ambrosianæ* of Christopher North, if they did not originate, they at least greatly contributed to a higher style of literary criticism than had before existed in Britain;

and then what helps to Bible and theological students have been Cruden's Concordance, Brown's Dictionary of the Bible, Edie's Ecclesiastical Cyclopedia, and the Tables of ancient coins, weights and measures, by the learned, witty, and humane Dr. Arbuthnot, physician in ordinary to Queen Anne! These authors are considered as having done pioneer work in modern Biblical literature.

Scotland has given to the world not only a fair share of religious books in the form of sermons, but also some valuable works on what is called natural theology, or the testimony of nature to the truth of Christianity. In this department we have such emi-

DUKE OF ARGYLE.

nent writers as the Duke of Argyle, the Rev. Dr. McCosh, Sir William Dawson, Hugh Miller, the honourable William Gladstone, Rev. Dr. Wardlaw, Professor Drummond, and others of less note.

The novel, like the newspapers, is now a powerful educator in good and evil. Some works of fiction are strongly tainted with skepticism, religious error and

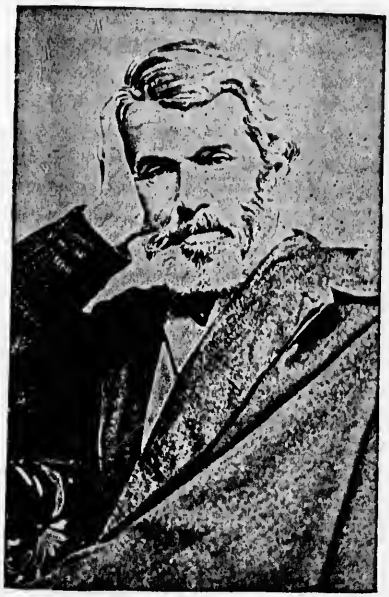
licentiousness. Scottish novels are happily free from such pollutions. From the magnificent productions of Sir Walter Scott down to the humbler efforts of the Scottish novelists of the present day, their tendency is to moral purity and goodness, and even their

SIR WALTER SCOTT.

failings lean to virtue's side. It is therefore pleasing to reflect that such healthful literature is at present so popular.

But how shall we classify that much Germanized, voluminous, and powerful writer, Thomas Carlyle, the sage of Craigenputtock, or as the English generally call him "sage of Chelsea"? As a brilliant historian and biographer he is unsurpassed. Warm hearted and sympathetic, with a keen sense of the

ludicrous, yet the fierce pamphleteer denouncing in furious language popular shams and humbugs. His writings lack the Christian element, else he had been a greater power for good in this dark world. Cham-



THOMAS CARLYLE.

ber's Encyclopedia says of him, "What position Carlyle will ultimately occupy in the literature of his country it is not easy to determine, . . . future ages may possibly wonder at their fiery splendors,

and fail to sympathize with their prophetic enthusiasms."

ROBERT LOUIS STEVENSON.

Such writers as R. L. Stevenson, Barrie, Crockett McDonald, Black, "Ian McLaren," Miss Muloch and Mrs. Oliphant, are benefactors to the novel reading public.

But Sir Walter Scott, above other literary men, deserves here more than a passing notice, not only on account of the great number and variety of his works, so rich in history and descriptive of natural scenery and human character; but also on account of the distracting circumstances in which his voluminous writings were produced. Literary men generally require quietness, leisure, and time for research, and for polishing their periods for the press; but no such

favorable circumstances were afforded Sir Walter, even during his years of financial prosperity, and while yet no cloud of financial disaster was seen on the horizon to overshadow his life, and urge his pen to greater production for retrieving his losses. In the full tide of his prosperity, and in the midst of innumerable official, social, and domestic distractions, as no other literary man, perhaps, experienced, his pen continued to be "the pen of a ready writer," and he the greatest wonder among ready writers of the period. This is well illustrated by the following extract from the *Glasgow Herald:*

"There is no house in all Great Britain, save the birthplaces of Burns and Shakespeare, which rivals Abbotsford as a goal of literary pilgrimage, and there is none with which so much of literary history is associated. True, it was but for a little while that its glory lasted, since no more than a score of years elapsed between Scott's removal to it from Ashiestiel and his death under its roof. Yet in that short time the brand new mansion was the scene of more intellectual activity and more social brilliance and enjoyment than has been witnessed by all the feudal fortresses of Scotland put together. From 1812 to 1826, at any rate, the literary life of Scotland may be said to have centered in Abbotsford, and it was thither, as to the intellectual headquarters of the country that every stranger of note, and many of no note at all but of great curiosity, came to pay court. Everybody knows how in those days of prosperity Sir Walter literally kept open house in his castle on the Border, receiving and tolerating visitors and invaders of all kinds, sometimes to the extent of 'sixteen parties in a day.' What a varied proces-

sion of figures, obscure and distinguished, welcome and obtrusive, must have passed through the doorway of Abbotsford during those busy and crowded years! Wordsworth and Miss Edgeworth, Tom Moore and Henry Hallam, Washington Irving and Sir Humphrey Davy, Wilkie and Turner, the exiled French nobles and the wandering Prince of Sweden —figures like these alternate with the typical inquisitive Yankee tourist, and also, be it added, with the commonplace lairds and plain farmers of Teviotdale and the Forest. In the golden months of autumn, and, indeed, whenever the Court of Session will let 'the Shirra' be off to his sheriffdom, there is a constant succession of breakfast parties and dinner parties, walking and riding and shooting excursions—what Carlyle in one of his atrabiliar moods not quite unpardonably called an 'inane racket'—culminating in that glorious day and yet more glorious night of the Abbotsford Hunt, which, as the Selkirkshire farmer declared, was "the ae thing in the warld worth living for." And all the while the kindly host, whose days seemed fully taken up with entertaining and hunting and planting and gardening, has his brains full of the adventures of Dandie Dinmont and Jeannie Deans, and Roland Græme and Rebecca the Jewess, and every morning in the early quiet of the study, sheet after sheet is filled with words which will fill the whole world for generations to come with laughter and tears."

THE FIRST PUBLISHER.

In the literary world, a publisher, that is, a publisher on a large scale and on his own account, is

really a title of a modern functionary; and Scotland seems to have some claim to the first of that now numerous class who do so much to enlighten the world: for thus speaks the *Scottish American* of January 5, 1898.

"The First Scottish Publisher.—Scotland—which has given to the publishing world its Constable, its Murray, its Blackwood, its MacMillan, *et multos alios*—seems to us to afford the best example of a modern publisher in the person of an unduly forgotten pioneer. The story of the *Edinburgh Review* has been so often told, and Lord Cockburn's eloquent testimony to Archibald Constable's princely methods and their effects is so well known, that it is only natural that earlier efforts should be forgotten. But there seems every reason to believe that an Edinburgh bookseller, Charles Elliot, was the founder of modern publishing, and that only premature death arrested an illustrious career. Constable's testimony is alone sufficient. At a time when it was still common to find thirty booksellers' names on a title-page, and when Johnson declared of remuneration at the rate of six guineas a sheet that 'it might be obtained for a particular sheet, but not *communibus sheetibus*, Charles Elliot had already begun the grand style of publishing, and had the courage to oppose the oligarchy of the London trade by planting a branch in its midst."

PAINTERS.

Scotland has produced so many painters, that we can scarcely afford space for their names. None of

them have attained perhaps to such excellency as a few of the continental artists, but take the artists generally of the old world, and Scotland, in comparison, is not behind them. Here is a list of which Scotchmen may not be ashamed: George Jameson, the Vandyke of Scotland; Sir Francis Grant, R. A., called the "good society" artist; Sir Henry Raeburn; Sir John Watson Gordon; William Aikman, David Allan, the Scottish Hogarth; Sir William Allan, the historical painter; the learned Allan Ramsay, chief painter to George III.; Alexander Nasmyth, who gave us the true portrait of Robert Burns; Sir David Wilkie; Thomas Faed; Horatio McCulloch; my cousin James Howe, "the panoramic and animal painter;" Sir Daniel McNee; David Roberts, the architectural painter; Noel Paton; Thomson of Duddington; Crawford; Brodie; Bonnar; Sir William F. Douglas; William Leighton Leitch, who taught water coloring to the Queen and all the royal family: and in photography we may well mention the late William Notman, a native of Paisley, whose fame as a photographic artist is unexcelled, and who has had studios simultaneously in Montreal, Halifax, Boston, Albany, and New York.

The fine arts may be employed for moral or immoral purposes: but Scotch art, whether pictorial or sculptural has invariably "leaned to virtue's side"; so that its tendency has been to elevate and refine the public taste. Those horrid caricatures of the kings of Scotland in the Picture Gallery of Holy Rood Palace are not Scotch but the daubs of one De Witt, a Dutch man.

SCULPTORS.

Of sculptors we have not so long a list as that of the painters, but it includes some who compare favourably with those of any other civilized country, such as Steel, Thom. Mossman, Rhind, Lawson, Drummond, McBeth, Douglas, Mrs. D. O. Hill, sister of Sir Noel Paton, Alex. M. Calder, of Philadelphia U. S., John Munro, of Baltimore, U. S., distinguished for works of solid merit in Britain and America—of these and a score of others Scotland has reason to be proud.

ARCHITECTS.

Of Scotch architects we need only mention two or three out of many. Robert Adam, a native of Kirkaldy, was made architect to George III. Says Beeton, "Adam gave a new turn to the architecture of his country, and procured great fame by the number and elegance of his designs. He and his brother were the first to make use of stucco in imitation of stone. He was buried in Westminster Abbey." James Ferguson, a native of Ayr, wrote largely on architecture in such works as, Ancient Architecture of Hindustan; Ancient Topography of Jerusalem; True Principles of Beauty in Architecture; The Palaces of Nineveh and Persepolis Restored:" and which last he illustrated by the "Assyrian Court," which he planned and erected in the crystal palace. He was appointed superintendent of the great Sydenham palace, London. Among the living architects of Scotland we cannot but mention our genial friend William Hay

who has lately restored St. Giles's Cathedral, Edinburgh, and made it "look as weel as new."

BOTANY.

Akin to the fine arts is the delightful science of Botany. Scotland has done much for botany; and indeed has been the means of making it worthy of being called a science. Thus the learned English journal called the *Athenæum* of 1858, in an extended obituary notice of Robert Brown, D. C. L.; F. R. S. says, "He was the foremost scientific man of the century. Till his time botany can scarcely be said to have had a scientific foundation." Humboldt called him *Botanicorum facile princeps*. He was born at Montrose, Dec. 21, 1773; died at London, June 10, 1858. Then we have had other illustrious botanists, who both taught and wrote extensively on the science, such as Professor Balfour of Edinburgh, Rev. Colin Milne who wrote a Botanical Dictionary.

ZOOLOGY.

In advancing and illustrating the nearly related subject of zoology, or history of birds and beasts, Scotland has given her fair share. Alexander Wilson of Paisley had nearly finished the eighth volume of his splendidly illustrated work—*The Ornithology of America*, when he died. Then another Paisley man James Wilson, F. R. S. E. younger brother to the celebrated Professor John Wilson, of Edinburgh (Christopher North) must be considered one of the greatest naturalists of modern times, for he has covered 900 pages of the Encyclopedia Britannica in illustration of his favourite subject. It is pleasing to

know that he was a most devout Christian, as his Biography shows, written by the fluent and graceful pen of the late Rev. Dr. Hamilton of London, himself a native of the "guid auld toun." Then last, but not least, we have had Professor William Macgillivray, of Marschal College, Aberdeen, whose principal and larger works were History of British Birds, History of British Quadrupeds, and Natural History of Dee-side.

CHAPTER XV.

TEXTILE MANUFACTURES.

As already noticed the mither Thistle, before sendin' her bairns out into the world has them a' decently clad. Wha has'na heard o' Paisley threid, Paisley shawls, Kilmarnoch bonnets, Scotch tweeds, carpets, cottons, and tartans? Scotland has had nae sma' share in supplyin the wide worl, wi' dacent comfortable claes, besides cleiding her ain bairns. Our scientific frien' McFarlane sent me the following facts, that, speak for theirsels: "Thomas Morton of Kilmarnoch, invented the barrel carpet loom, and three-ply carpets,—great inventions.

"Richard Whytock of Edinburgh, invented the method of weaving Brussels carpets on a plain loom, —one of the most scientific and beautiful inventions on record.

"In a lecture delivered before the society of Arts in London, April 30th, 1856 by Joseph Burch, he says, 'Glasgow Calico printers are ahead of all competitors. If there be any new machine or process enquire first in Glasgow: you will not find it in Manchester. Glasgow seeks and encourages every novelty. The delaine trade, the handkerchief trade, the shawl trade, and the muslin trade, are now principally in Glasgow hands, and they do them well.' ".

"Scotland introduced the muslin trade into Ireland, and taught the peasantry the method of embroidery of fine linen cambric: it has been a great blessing to that country."

A NEW ARTIFICIAL SILK.

Scottish American, 1898.

A PROSPECTIVE GLASGOW INDUSTRY.

"Processes for the production of artificial silk have engaged the attention of inventors for many years. Search amongst the numerous vegetable fibers, more especially those of tropical climates, has been made by one set of inventors in the hope of finding filaments of a sufficiently fine substance, with the glossy surface necessary to present the characteristic appearance of the silk obtained from the cocoon of the silkworm; and another set have been working with solutions of gun-cotton so as to obtain fine filaments having a lustrous surface.

"But a new process invented by Mr. Adam Millar, manufacturer, Montrose street, Glasgow, produces an artificial silk from gelatine by a process of remarkable simplicity, so that the fine yarn can be sold at a very low price, and still give a handsome profit to the maker. Now, gelatine is the very material from which the silkworm produces its filament of silk. The silkworm produces gelatine, which it ejects as a fine stream from a small gland in its head. As it leaves the gland the gelatine is quite liquid, but it becomes an insoluble filament when it is formed into the cocoon. How it becomes insoluble is some what diffi-

cult to say for there is no chemical treatment to which it is subjected."

TRAVELLERS AND EXPLORERS.

It has already been observed that the young thistles are great travellers. When the time has come for them to leave their native place, they issue forth in search of adventures; they rise, and whirl, and soar,

"In a' the airts the win' can blaw,
And o'er the hills an' far awa."

So, we see James Bruce, of Kinnaird passing through Arabia Felix and on to Abyssinia in search of the source of the Nile; and Mungo Park, of Selkirkshire, away in Africa to solve the problem of the existence and course of the river Niger; and Thomas Pringle, the poet and philanthropist, travelling and working to put a stop to the slave trade in Africa,

"Where in the desert he loved to ride
With the silent Bushboy by his side."

There are Livingstone and Moffat doing pioneer missionary work in the same dark continent; and followed by such courageous explorers as Keith, Johnston, and Joseph Thomson, the latter of whom received the gold medal of the Royal Geographical Society, also the gold medal of Edinburgh University for geology and zoology. And there is Sir John Ross, a Wigtonshire man exploring the Arctic regions, and astraddle of, not the geographical but the magnetic North Pole; and John Rae L. R. CS., M. D., LL.D., F. R. S., F. R. G. S., an Orkney man who covered 23,000 miles chiefly on foot, and enjoyed excellent health in the same cold regions during two winters,

while living like the Esquimaux in snow huts and without fire; Sir John Richardson, fellow explorer with Sir John Franklin; Simon Fraser of Culbogie who discovered the river far north which bears his name; and Sir Alexander Mackenzie is honoured by his name being given to the river which he discovered and explored in the same far away country. What a long, difficult journey must it have been for Lord Selkirk's Highlanders to leave Scotland and make their way to the Red River without steamboat or railway! They were pioneers of thousands and probably millions now moving to the North West. Need we mention John McLean, an Argyleshire man, the first white man who saw and described the Great Falls of Ashwanipi, in Labrador? Or the grandson of the Earl of Moray, Arthur St. Clair, who gave his name to one of our smaller lakes, and who founded the city of Cincinnati?

Last year our public papers had this brief item of news, "London, Oct, 28.—Robert Brown is dead," Now there may be many Robert Browns, of different nationalities; but who is this whose name and fame should seemingly be known to everybody? Let the following obituary notice tell:—

"Robert Brown ('Campsterianus') was born at Campster Caithness, March 23, 1842. He was educated at the University of Edinburgh and in the European universities. Between 1863 and 1866 he travelled for scientific purposes in many of the least known parts of America and some of the Pacific Islands, from the West Indies and Venezuela to Alaska and Bering sea coast, as botanist in the British Columbia expedition and commander of the Van-

couver island exploring expedition, during which he charted all the interior of Vancouver, then unknown. In 1867 he visited Greenland and formed those theoretical conclusions regarding the nature of the inland ice, afterwards confirmed by Nansen and Peary.

"Since then Dr. Brown has travelled extensively, and has been engaged in educational work. He was an honorary or ordinary member of many learned societies in England and America and on the Continent, of many of which he was an officer. His name has been attached to various new species of plants discovered by him and to geographical points in Vancouver island and elsewhere.

"He wrote wholly or conjointly about thirty volumes and a large number of scientific memoirs and nearly 4,000 articles in reviews in various languages. His separate works are chiefly geographical, ethnographical, and natural history."

Many more illustrations of the thistle's propensity to travel might be given, but let these suffice.

The thistle "ettles weel" in its travels. In plain speaking, when true Scots leave home for distant lands, they have generally some definite, sensible, worthy object in view; and they generally succeed. But to succeed requires certain mental, moral and bodily qualities; such as intelligence, honesty, temperance, courtesy, humour, enterprise, courage and perseverance. Now all these elements of character for success in social life are notoriously those of the genuine Scot the world over; and they are traceable to his training in the Christian religion, which expands his mind, warms his heart with kindly affections, and leads his conscience habitually to "lean to

virtue's side." It must be acknowledged, however, that there are many exceptions to this general character. How may these be accounted for? First, there are many natives of Scotland now-a-days who cannot be called Scotch, because they are the offspring of some foreign immigrants, and who although influenced in some degree, for good, by Scotland's religion, are yet opposed to it. They may speak the braid Scotch, but they have not the Scotch mind, heart, or conscience. Next, as in all Christian communities so among the purely Scotch, we may expect to find some "black sheep." And, further, we must notice a distinction between Highlanders and Lowlanders, for example, in the matter of courtesy, Professor Blackie says, "The Highlander is always a gentleman: the Lowlander only sometimes." To which we may add, that there is between Highlander and Lowlander such an intermixture now that Lowland gruffness has become greatly modified for the better and tends to success in life.

TEMPERANCE AND GENEROSITY.

But the general Scotch character is not uncommonly charged with certain objectionable qualities that really do not belong to it, such as avarice, drunkenness, and radicalism. If radicalism means opposition to tyranny in church or state, and fighting for liberty to do and enjoy what conscience believes to be right, then Scotland may, with great justice, be charged with radicalism. Scotland is not the drunken nation that some people suppose. If temperance means total abstinence from all alcoholic drinks, then Scotland, in proportion to her popula-

tion, has as large a number of total abstainers as any other Christian nation.

For the information of all who are interested in the drink question, Dr. Cawson Burns, of the United Kingdom Alliance, has analyzed the liquor bill of Great Britain and Ireland for 1891. Here are some of his figures:

"Comparing the consumption per head for England Scotland and Ireland, it appears that every man, woman and child in England expended on drink £4 1s. 3d. in the year, while in Scotland the per capita consumption was equal only to £3 5s., and in Ireland it came down to £2 2s. 4d. The gross figures are full of meaning for the temperance party, while the comparative tables acquit the people of Ireland from a long standing superstition which has prevailed in reference to their capacity for strong drink."—*Empire*, Toronto.

"Out of fourteen magistrates in Glasgow ten are teetotallers. These figures at once indicate the strength of the temperance vote in the Council Chamber there." 1896.

The charge of avarice, if not something worse, against Scotchmen is sometimes made by saying that "Scotch folks keep the Sabbath and everything else they can get." The great French lecturer, Max O'Rell, thought fit lately, to make the same charge in another form. In his lecture in Toronto on the characteristics of Englishmen and Scotchmen as compared with Frenchmen, he said some good things of the Scotchman, such as that he was "frugal, industrious, persevering and humourous. He was strong as the granite of his native hills. He was not

easily won over, but when once he is your friend he is your friend forever. The Scotch were the great sinew of the British Empire." But after all this laudation O'Rell goes on to say, that the Scotchman "can read, write, and reckon—especially reckon. Jews never got a footing in Scotland. One went to Aberdeen once, but left next day with his traps. When asked if he left because no other Jews were there he replied, 'No, they were all Jews.' "

Now, we happen to be much better acquainted with Scotland and the Scotch than Monsieur O'Rell can possibly be, and we repudiate and repel as utterly unwarranted and without foundation in truth this charge of avarice, penuriousness, niggardliness, or by whatever other name this alleged national selfishness is called. As to Jews in Scotland, we have no statistics at hand to inform us as to their numbers there; but this we know for a fact, that about the year 1833 there must have been some Jews thriving in the city of Glasgow, for they were the first to purchase a burial place in the aristocratic Necropolis, at that time, and adorn it at great expense; and we have not heard of them since leaving the city "with their traps." As to Aberdonians, we have been acquainted with some individuals and families of them in different parts of this wide country, and have found them no less generous than their neighbours of other nationalities; and we know somewhat intimately a considerable congregation which consists almost exclusively of them, whose minister, after serving them for about a dozen years, told us that they were a people so kind and generous to him, that "he believed they could not feel comfortable in their beds

if they supposed their minister were not comfortable." If such be the case with the much misrepresented Aberdonians, O'Rell, and such as he, may learn to think more correctly and justly of the Scotch in and from other parts of Scotland, where the natives are supposed to be more open handed. There are of course some close-fisted Scotch folk—some born and brought up on moorlands where the bawbees are unco scarce and maun therefore be weel hained and wisely spent so as to be just and honest before being generous—these sentiments and habits are apt to cling to such people as part of their religion, even when the bawbees are no longer scarce; others who have never been poor, are stingy; but such mean creatures are found everywhere. They are, however, the exception in Scotland, as every one acquainted with the country can testify. Highland hospitality is proverbial; and with equal justice might we speak of hospitality in the Lowlands. But let us consider Scotland's liberality on a great scale. When a famine occurs, or destitution among masses of workingmen, from want of employment—events which have occurred more than once to nations outside of Scotland—then whence come, according to ability, the largest contributions for relief of the distress? When what is called the Disruption of the Established Kirk of Scotland in 1843 occurred, and some hundreds of ministers, for the sake of principle, left their comfortable manses, glebes, and legally assured stipends, trusting for future support to the voluntary contributions from such of the people as might follow them—what a magnificent example ensued in building manses and churches, and in raising funds

for the support of the ministers and missionaries! It was indeed "a liberality above all praise, and which has not yet ceased!" Have the clergy and people of O'Rell's France, or indeed of any other nation ever shown a greater devotion to principle, or a greater voluntary liberality? The other religious bodies in Scotland show a similar generous spirit in supporting religious and benevolent institutions. When the Scots leave home and settle abroad they are the givers rather than the receivers of charity. Of the scores of tramps who have come to our door not half-a-dozen have been Scotch, and only one of these few did we discover to be a scheming, ne'er-do-weel.

Who are the men in our day most noted for liberal gifts for promoting the world's welfare? Sylvester Lind, who arrived in Chicago from Scotland with just two sovereigns in his pocket, gave to the trustees of the Presbyterian University to be established at Lake Forest, above twenty-five miles north of the city, the sum of one hundred thousand dollars. John Ross Robertson, proprietor of the Toronto *Telegram*, has erected a large, commodious summer residence, on the island opposite Toronto, to afford the poor children of the city the benefit of fresh air from the lake. William Dunn, M. P. devoted four thousand pounds last year, to purchase an open space in Paisley, Scotland, for the benefit of workingmen. The following is from the *Scottish American Journal* of October 25th, 1891:

MCGILL UNIVERSITY, MONTREAL.

"Mr. Peter Redpath, the chief partner in the larg-

est sugar refinery business in Canada, now resident in England, has announced his intention of presenting the McGill University, Montreal, with a library building at a cost of about £40,000. The University, which is dependent upon voluntary aid, has already benefited by Mr. Redpath's generosity, its fine museum valued at £20,000 having been given to it by that gentleman ten years ago. The original foundation of the University was £120,000 bequeathed by the Hon. James McGill in 1813, and it has since been the recipient of several handsome gifts, among them Sir Donald A. Smith's endowment of the faculty for women with £24,000, and Mr. W. C. McDonald's donation of £100,000 for the erection of the physic and technical buildings and the endowment of the law faculty."

Says the Toronto *Empire* of October 10, 1891:

ANOTHER ACT OF MUNIFICENCE.

"With the Victoria hospital, the result of Sir Donald Smith's and Lord Mountstephen's princely gift of $500,000, nearly completed, and $200,000 for McGill from Mr. Peter Redpath, there comes another fine donation to one of our most useful institutions. It is learned that the will of the late George C. Hamilton, who died a few weeks ago in Colorado, shows that $100,000 has been left to the Montreal General Hospital, on Dorchester street. The deceased was a son of the late Hon. John Hamilton, so well and favourably known in the Dominion."

Again, we read in another paper that "Lord Mountstephen (son of a workingman) has given a thousand pounds towards the extension of the Mareschal Col-

lege, Aberdeen." I see he has just given $1,000 for the famine in India. It is so like him. And here is more about W. C. McDonald of Montreal:

"He has given $85,000," says the *Scottish-American* of March 23rd, 1892, "to McGill University, to be applied as endowment for the maintenance of the Experimental and Engineering buildings which were founded by him."

ANDREW CARNEGIE.

And what shall we say of that more than princely giver, Mr. Andrew Carnegie, who has lavished his wealth on his native country more than we wot of? The New York *Sun* says of him:

"He is reported to be the richest Scotchman in the

world, with a larger income than any of his aristocratic countrymen, who while enjoying the domains and palaces that come to them by inheritance, are apt to be hard up for cash at times. Mr. Carnegie talks freely of the days of his poverty in Scotland and in this country, and tells now happy he was when able to earn as high wages as $3 a week in Pittsburgh. He recounts his struggle from that time till he became wealthy. He is not afraid to scarify those of his fellow millionaires who are mean with their money, and, a short time ago, went so far as to say in print, that 'the man who dies rich dies disgraced.' If he himself dies poor he will have to get rid of a good many of his millions before losing his renown as the richest Scotchman in the world."

The following items in the *Scottish American* for 1892 are specimens of Andrew's gifts:

"Mr. Andrew Carnegie's generous gift for a great library in Pittsburgh, Pa., which aggregates $2,100,000, provides that $50,000 shall be annually devoted to the purchase of American works of art."

"Mr. Andrew Carnegie has given $30,000 for the establishment of a public library in Fairfield, Iowa."

THE NEW MUSIC HALL—A SUBSTANTIAL GIFT TO NEW YORK.

"What is called the Music Hall, inaugurated in this city by a series of concerts last week, is not a single hall but a number of halls under one roof. They comprise the principal auditorium or Music Hall, Recital Hall, Chamber Music Hall, Large and Small Banquet Halls and Meeting Rooms and Parlours, suit-

able for lectures, readings and receptions, as well as chapter and lodge rooms for secret organizations. The building is said to be, substantially, a gift to the music lovers of New York from our countryman, Mr. Andrew Carnegie. It is situated at the corner of 57th street and Seventh avenue, a situation which is easy of access from various parts of the city."

CHAPTER XVI.

REVERED ABROAD.

It is as true now as when Burns wrote it, that "Scotia is revered abroad." She is revered *for what she is not*, as well as for what she is. For *what she is not* let the following simple illustration, by Dr. Waugh, of London, England, explain and suffice. The Board of Governors of the Millbank Penitentiary had met and determined to try Scotch broth for the prisoners; and for this purpose they despatched an official to the female prisoners to find a Scotch woman to prepare a specimen, as they, being Englishmen, were not acquainted with the article. They then went on with their business, meanwhile supposing that the Scotch woman was in the kitchen preparing the specimen. After long waiting the messenger appeared and reported, saying, "I have searched all the penitentiary and a Scotch woman cannot be found in it."

But it would be far from the truth to insinuate that Scotch folks are not found as inmates of our penitentiaries. Yet their number as compared with the number of inmates of other nationalities on this side or the other side of the Atlantic, is a testimony in favour of the comparative morality of Scotland, so far at least as indictable crimes are concerned. The following, from a recent number of the Toronto

Mail and Empire, speaks for the Scot in Canada during the past year:

"The birthplaces of persons convicted for indictable offences in the Dominion during 1897, are as follows: England and Wales, 382; Ireland, 233; Scotland, 91; Canada, 3,949; United States, 246; other foreign countries, 223; other British possessions, 10; not given, 587. The proportion of convictions by birthplaces to the total number for the years 1884 to 1897 is as follows: England and Wales, 8.44; Ireland, 6.21; Scotland, 1.99; Canada, 68.33; United States, 5.32; other foreign countries and British possessions, 3.51; not given, 6.20. For the year 1897 the proportion is: England and Wales, 6.68; Ireland. 4.07; Scotland, 1.59; Canada, 69.03; United States, 4.30; other foreign countries and British possessions, 4.07; not given, 10.26.

SCOTTISH BANKING.

Which system of banking is considered by business men to be the safest for the depositers and bill-holders, and at the same time convenient for borrowers? Let the following testimony answer. An article appeared in the *Hamilton Spectator*, of the 20th of October, copied from the Chicago *Inter Ocean*, and dated Halifax, October 9, 1896; in which reference is made to the then existing unrest in the United States occasioned by their possible adoption of the free coinage of silver. The writer of the article, in an interview with Sir William Van Horne, the President of the Canadian Pacific Railway, asked him, "Does the unsettled condition of things affect the Canadian markets?" Sir William replied: "It certainly does

affect them; but the utilization of the Scottish banking system here greatly reassures Canadian finances." This testimony to the merits of the system, coming from such a man means much. For Sir William is one of the most intelligent, practical, energetic, and successful of the business men in Canada, as is proven by his accumulation of wealth, and his admirable management of the magnificent railway of which he is President.

Scotland should be revered in England for what she has done there. Scotch missionaries evangelized nearly the whole of England after the pagan Saxon conquest of the country; and Scotland gave it macadamized roads, locomotive and stationary steam-engines, steamboats, bicycles, electric telegraphs, electric lights, telephones, and almost all the great modern improvements in agriculture and agricultural implements. And who founded the Bank of England —the greatest bank in the world? It was Willie Paterson, a Scot; and it has been admitted by the highest authorities that it was Rev. Dr. Henry Duncan, another Scot, who first gave Savings Banks to England and to the world at large. And whence are drawn those rich and numerous donations for religious and benevolent purposes in England, dispensed by Miss Burdett Coutts? They come from the wealth of Thomas Coutts, an Edinburgh Scot. Sensible Englishmen do now-a-days revere Scotia in a way that would have astonished Dr. Johnson and Rev. Sidney Smith, as may be seen by such recent appointments in the English Church as the Rev. Dr. Tait to be Archbishop of Canterbury, and the Rev. Dr. Thomson, and the Rev. Dr. McLagan, in suc-

cession, as Archbishops of York—their offices being next in social diginity to that of royalty itself; and we need scarcely mention, that, Scotchmen not infrequently hold the very highest offices in the civil government, the army, and the navy.

If Scotland gave St. Patrick to Ireland—the founder under God, of the Irish Church; and gave also the linen trade, and the thrifty, industrious folks called the Scotch-Irish, then Ireland may well revere Scotia as we know she does.

THE SCOT IN RUSSIA AND TURKEY.

Russia, like other nations has been benefited by Scotch inventions, but has had long ago some special reasons for revering Scotia. The Diary of General Patrick Gordon, a cadet of Lord Aberdeen's family, shows that he was the familiar friend and adviser of Czar Peter the Great, that he was the leader of the ideas of the young Czar, and suggested and planned his policy towards Turkey—a policy which Peter's successors have pursued to this present day. It is believed that it was Lord Cathcart, who happened to be in Russia at the time of the French invasion, who suggested the burning of Moscow, an expedient, that saved Russia, and sent Napoleon Bonaparte home with the miserable remnant of 12,000 men of the 500,000 with which he had left France on his Russian expedition. Some Scots in various walks of life have been honoured in Russia, and some even in Turkey, as the following anecdotes may show:

"James Ferguson, the Scotsman, who entered the Russian service in the first part of the eighteenth century, was deputed at the end of the war with the

Turks to treat of peace with the Turkish Grand Vizier.

"The two officials met, with two interpreters, Russian and Turkish, between them. Their business was satisfactorially concluded, and they arose to separate. General Ferguson, hat in hand, made his bow, and the vizier his salaam. Then the latter, the official part of the interview being at an end, turned suddenly, approached, and taking Ferguson warmly by the hand declared with a broad Scotch accent that it made him 'unco happy, noo that they were sae far frae hame to meet wi' a countryman in his exalted station.'

"Ferguson stared with astonishment and the turbaned vizier went on to explain—

"'My father was the bellman of Kirkcaldy in Fife, and I remember to have seen you and your brother occassionally passing.'

"Another similar surprise, which was due to other causes, befell a Scotchman named Wallace, who, while travelling on the great plain that lies between the Sea of Azov and the Caspian, was astonished to find on his map a place marked 'Scottish Colony.' On making inquiries about it at Stavropol he was referred to a venerable man with fine features, coal-black eyes, and long beard that would have done honour to a patriarch, who, in turn, asked him why he wished to know about it.

"'Because,' said Wallace, 'I myself am a Scotchman, and hope to find a fellow countryman there.'

"His astonishment was extreme when the Circassian-seeming patriarch replied in genuine broad Scotch—

"'O, man, I'm a Scotsman, tae; my name is John Abercombie.'

"The explanation of this incongruous name and personality was a simple one. In the first part of our century a band of Scotch missionaries went to Russia to convert the Circassian tribes, and received from the Emperor a grant of land on the frontier. Here they lived, and finding the older Circassians obdurate under their teachings, bought from them Circassian children that they might bring them up to the Christian faith."

The Aberdeen Pasha.—There was, three years ago, in Kensington infirmary, says a correspondent of a contemporary, an old man of 90 years of age. For all the writer knows he may be there still, but he told him the following story. He is an engineer by trade and belongs to Glasgow. In the Russo-Turkish war he was chief engineer on a Turkish ironclad in the Danube. One day something had gone wrong with the machinery, and Hobart Pasha came on board. The engineer was busy with the repairs when he heard the voice of the admiral up on deck. The next minute he felt a slap on his shoulder, with an exclamation in guid braid Scotch. "Ye're makin' a fine job, my lad; it'll dae rale weel." "Guid preserve's a'," says the engineer, "whaur dae you come frae?" "Dod, man," says Hobart Pasha, "did you no' ken I belang to Aberdeen? Hobart's my surname, and after I cam' here they stuck on Pasha to mak' folk think I was a Turk." Toronto *Empire*, September 15, '93.

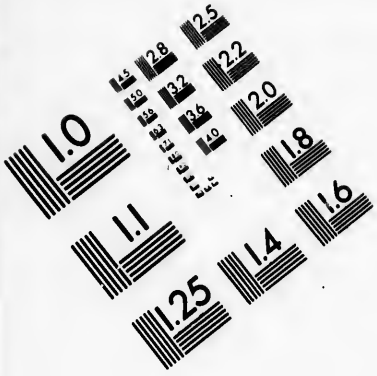
Can the Chinese government cease to remember and respect the country of the late General Gordon who, simply with a baton in his hand, led on the gov-

ernment army to victory after victory until a powerful armed rebellion was crushed? The question was recently answered by China's greatest statesman, Li Hung Chang, placing a wreath on Gordon's monument, in St. Paul's Cathedral, London. Nor should China cease to revere the country of John Kenneth Mackenzie, who founded the first government Medical school in the Empire.

THE SCOT IN INDIA.

India greatly reveres auld Scotia, as the following item from a not very old paper proves:

"At a meeting held in Bombay to commemorate the anniversary of St. Andrews's Day, Dr. Buist, who was one of the speakers showed how much India was indebted to Scotchmen, stating that the 'Bombay *Quarterly Review* is chiefly written by Scotchmen, is printed by a Scotchman; and published by a Scotchman. The *Bombay Gazette* is conducted by a Scotchman; the *Telegraph and Courier* has, with one exception, always been conducted by Scotchmen, and is so still. He who does the *Times* is a Scotchman—(laughter)—the *Bombay Guardian* and *Oriental Christian Spectator* were founded or conducted by Scotchmen. The Asiatic and Medical Societies are presided over by Scotchmen. The principals of both our colleges are Scotch, and some of the professors are Scotch: and those who have not been so favoured in their birth have wisely endeavoured to remedy the deficiency by marrying Scotch wives. (Laughter.) The Director of Public instruction is a Scotchman and so is the senior inspector of schools. Our Governor is a Scotchman, three of his personal



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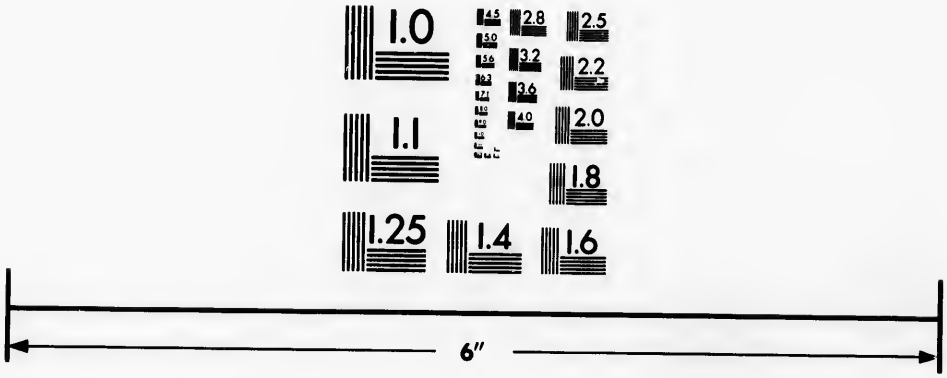

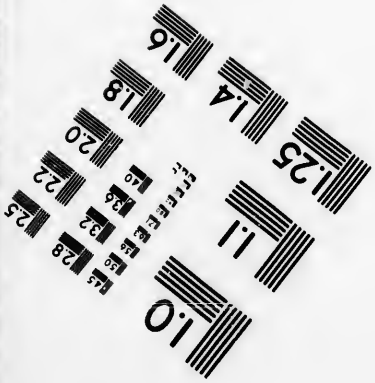

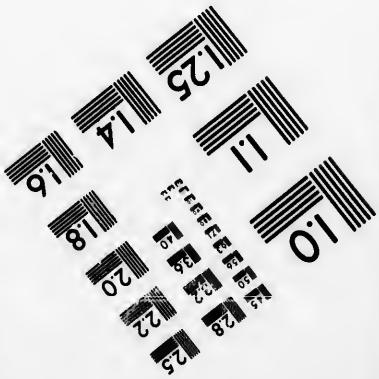

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staff are Scotch. Of the last ten governors who have presided over us, five have been Scotch, and for thirty years, out of sixty, Bombay has been blessed by a Scotch administration. We have a Scotchman at the head of the Commissariat, and another for his deputy. Our Quartermaster-General is a Scotchman, and so is the Surgeon-General; while our Garrison Engineer, Civil Architect and Dockyard Engineer are all Scotch. It is quite clear that our noble army could neither be fed, physicked, or clothed, taken to the field, nor made comfortable in cantonments, except for Scotchmen."

THE SCOT IN CANADA.

Canada, even French "Lower Canada" as we used to call it, reveres Scotia, as may be seen by the prominent places in public life to which Scotchmen have been raised by their fellow citizens throughout the dominion. Thus the Toronto *World* speaking of the elevation of George Stephen to the peerage of Great Britain, under the title of Lord Mountstephen says, "He is the best representative of a class of men who have come to Canada and prospered. We mean those young Scotchmen who left their home in boyhood without other means than their native energy and intrepidity, and who settled in Canada, engaging in commercial pursuits, and amassing, as a rule, large fortunes. These are the kind of men wh omade Montreal, who made the bank of Montreal, who built the Canadian Pacific Railroad, who have succeeded all over Canada, and in India for that matter, in much the same way. Any one who knows Montreal, who knows Canada, can name these men by scores."

SCOTCH EDUCATIONISTS IN CANADA.

Passing over the names of the many Scots in Canada who are wealthy merchants, popular clergymen, clever lawyers, and distinguished judges; and passing over also a list

"as lang 's my arm"

of the parliamentary Scots who have attained to the high political position of being honourables or senators of the Dominion; let us just glance at the chief educationists,—the college professors and others throughout the Dominion, and we shall find that some of the most important colleges and universities have Scots at their head. Among the earliest of Canada's eminent educationists—the men who taught our clergy, lawyers, and judges in the higher branches of learning were Rev. Dr. Wilkie of Quebec, and Rev. Dr. Strachan of Toronto, afterwards Bishop of the Toronto Diocese. Sir Daniel Wilson is President of the Toronto University. Rev. Dr. George Munro Grant is Principal and Vice-Chancellor of Queen's University, Kingston. Sir William Dawson is Principal of McGill University, Montreal. Rev. Dr. James Ross is Principal of Dalhousie College, Halifax. And Rev. Dr. Alexander McKnight is Principal of the Presbyterian College in the same city. Rev. Dr. Willian Caven is Principal of Knox Presbyterian College, Toronto, and successor to the late Principal, Rev. Dr. Michael Willis. Rev. Dr. D. H. McVicar is Principal of the Presbyterian College, Montreal. Rev. Dr. George Douglas is President of the Methodist College, Montreal. The late Rev. Dr. Robert Alexander Fyfe was Principal of the Baptist Cana-

dian Literary Institute, Woodstock. The Right Reverend Dr. John Cameron, Roman Catholic Bishop, is President of Arichat College. The Most Reverend Dr. Robert Machray, of the English Church, is Chancellor, Warden, and Professor of St. John's College, Winnipeg, Manitoba, and now Primate of all Canada: and the Rev. Dr. George Bryce is Head and Professor of Manitoba College. Then in the universities and colleges represented by these presidents and principals, and in other colleges of the Dominion, are many eminent Scotch professors, in various branches of science, too numerous to mention by name.

THE SCOT IN THE UNITED STATES.

And in the United States wherever Scotchmen retain their true national character they are respected, and are generally successful in social life. The Rev. Dr. Talmage who boasts of having a drop of Scotch blood in him, and who may be regarded as an authority in expressing the true American sentiment on this subject, gave his testimony some years ago in the *News of the Churches*. Comparing and contrasting the different kinds of immigrants that land in the States, he says: "The Scotch come here with their honesty, their industry, their religion, their handicrafts, their Bibles, their love for the primer, the school-master, the catechism, the Sabbath, the sanctuary, the ministry, to bless us. With rare exceptions they do well for themselves and for us." Mr. Andrew Carnegie may well be regarded as another authority in testifying to the respect in which Scotchmen are generally held in the States; for at a

banquet held at Delmonico's, New York, an St. Andrew's Day, last year (1891), after giving the Scotchman credit for having "a head that is practical, shrewd, and calculating, but a heart that is full of poetry and sentiment; and a strong love for civil and religious liberty:" Mr. Carnegie then quoted from a standard American author,—Bancroft's "History of the United States," that "The first voice for independence of the United States came not from the Puritans of New England, not from the Dutch of New York, not from the families of Virginia, but, from the Scotch Presbyterians of North Carolina. Another service of a Scotch-American was found when after Independence had been declared, and won in the field, a Constitution had to be drawn up for the country. That Constitution, the grandest political work ever conceived, was the production of Alexander Hamilton, a Scotch-American, and one of the greatest minds that ever figured in American history."

But there are some other Scotch-American names worthy of notice who signed the Declaration of Independence, such as Philip Livingston, who took an active part in the Congressional business of the period, was one of the founders of the New York Society Library, and aided materially in establishing Columbia College. Robert R. Livingston, of noble descent from Lord Linlithgow and the Earl of Wigton, and who was Chancellor of the State of New York, although not a signer of the Declaration, administered the oath of office to President George Washington, was appointed Minister to the Court of France, and greatly aided Fulton with his counsel

and money in building the first steamer that plied on the Hudson River. Mr. James Wilson, a native Scot, was a signer of the Declaration: and was an active member of the Committee that framed the Federal Constitution. He was appointed by President Washington one of the Judges of the Supreme Court of the United States. The Rev. Dr. Witherspoon, a descendant of John Knox, was a native Scot, born at Yester, near Edinburgh. He signed the Declaration; and indeed, it is said, that he led the others, by his eloquence, to do so, when they were "switherin aboot it." He was called from his office as minister of the Kirk in Paisley, Scotland, to be President of Princeton College, New Jersey; and the war having dispersed the college, he was for seven years a leading spirit in the United States Congress. In confirmation of what has been already said on this subject we may accept the testimony of that skeptical Frenchman, Max O'Rell, who has given far more study to national characteristics than he has given to the Bible and the Christian religion. In his book, "A Frenchman in America," he says: "The railway king in Wisconsin is a Scotchman. I was not surprised to hear it. The iron king in Pennsylvania is a Scotchman, Mr. Andrew Carnegie. The oil king of Ohio is a Scotchman, Mr. Alexander Mac Donald. The dry-goods-store king of New York —he is dead now—was a Scotchman, Mr. Stewart. It is just the same in Canada, just the same in Australia, and all over the English-speaking world. The Scotch are successful everywhere, and the new countries offer them fields for their industry, their perseverence, and their shrewdness. There you see them

landowners, directors of companies, at the head of all great enterprises. In the lower stations of life, thanks to their frugality and saving habits, you find them thriving everywhere. You go to the manufactory, you are told 'that the foremen are Scotch.'"

LOVE OF LIBERTY.

Scots, like other nations have an innate love of liberty; but this has been intensified and inherited by the national history of Scotland which is a record of many long and victorious struggles against both ecclesiastical and civil tyranny. This fervid love of liberty is apt to degenerate into rudeness, unmannerliness, and lawlessness if not controlled and guided by the reverential and refining influence of the Christian religion. But happily for Scotland that religion is, or was, influential and has saved her people from being numbered among the anarchists. Wherever Scotchmen go they carry with them the national ideal of Christian liberty, and intelligent notions of what constitutes national prosperity. For instance in England let the following item from the *Scottish American* of October 31, 1888 tell its own tale:

"Seven Clever Scots.—The seven Scotchmen who, along with a citizen of the town, met in an upper room in Manchester and formed themselves into the Anti-Corn-Law League, were W. A. Cunningham, Edward Baxter, Andrew Dalziel, James Howie, James Leslie, Philip Thomson, and Archibald Prentice (Editor of the *Manchester Times*, and author of the 'History of the League')—all of whom were Scotchmen. Mr. William Rawson, a Manchester man and an Englishman, was invited, but was unable to reach the place

until the meeting had broken up; but he was appointed treasurer of the league."

As in England so in Canada, the United States, and wherever they are they are generally prominent as the reformers of public wrongs. See in Canada that plucky little man, William Lyon Mackenzie, who in fighting against the misgovernment of the country by a corrupt political clique, lost all, became a leader in rebellion and an outlaw, for whose head a large reward was offered; but whose political principles are now admired and acted upon by the most loyal and conservative of Canadian statesmen.

See the Honourable George Brown, Editor of the Globe, for many long years the distinguished and almost worshipped leader of the reform party in the Dominion. As might be expected Scotchmen have done something on behalf of the enslaved negroes.

Thomas Pringle, a Scot, a true poet, and courageous philanthropist after having seen the horrors of slavery in Africa, returned to England and became secretary to the Antislavery Society until its object was accomplished.

See that magnificent specimen of a Scot—Zachary Macaulay, father of the degenerate Thomas Babbington Macaulay the historian. Zachary grieved and disgusted with what he saw of slavery in Jamaica, resigns his lucrative office of manager of a large slave estate, and associates himself with such philanthropic abolitionists as Granville, Sharpe, Wilberforce, and Thornton, in England, and finally becomes the laborious governor, secretary, paymaster, judge, correspondent, and clerical substitute for preaching and marrying in Sierra Leone, the colony

of liberated slaves, where he faces death itself on their behalf. Another instance of this Scottish love of liberty and fair play, is that of John Hossach who died last year (1891) at Ottawa, Illinois. The *Scottish American Journal* says of him, he "Was a Scotchman of whom his fellow countrymen in America may well be proud. He was full of the manly independence and love of liberty which characterize the true-hearted Scot, and was a strong friend of the down-trodden slave during the progress of the abolition movement. He had the practical charge of the 'underground railroad' in this state, and was a prominent figure in one of the most memorable trials which has taken place in the history of Illinois" He and Dr. Stout were tried for aiding the escape to Canada, of Jim Gray, a fugitive slave from Missouri; they were convicted, and fined one hundred dollars and costs, and sentenced to ten days in jail. We give here only the closing sentences of John Hossach's famous argumentative speech against slavery, addressed to Judge Drummond who sentenced him:—

"My feelings are at my home," he said. "My wife and my children are dear to my heart, but, sir, I have counted the cost. I am ready to die, if need be, for the oppressed of my race, but slavery must die, and when my country shall have passed through the terrible conflict which the destruction of slavery must cost, and when the history of the great struggle shall be candidly written, the rescuers of Jim Gray will be considered as having done honour to God, to humanity, and to themselves. I am told there is no appeal from this court, yet I do appeal to the court

of high heaven, where Judge Drummond and Judge Caton, the rescuer and the rescued, shall all have to stand at the judgment seat of the Most High."

The speech produced a profound sensation, and was printed in full by all the leading papers in the North.

Here ends our record of Scotland's character and her share in enlightening and civilizing the world. The record could be enlarged, but it need not be. Considering the smallness of the nation compared with others, her population being only about a sixth of that of England, her influence for good among the nations has been far beyond what might have been expected. Her worldly prosperity has been due, doubtless, to her characteristics of intelligence, industry, and perseverance, but not less to her generosity rewarded according to the divine promise, "Give and it shall be given unto you."

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