

required for the North-Western Railway alone. The electric telegraph was the indispensable companion of railways. 7,200 miles of telegraph, or at least 36,000 miles of wires, were laid down. 3,000 people were continually employed, and more than a million of messages were annually flashed along this silent highway.

#### ANIMALCULÆ—THE WONDERS OF THE MICROSCOPE.

The recent astonishing discoveries of Ehrenberg, a Prussian naturalist, have given a new aspect to this department of animated nature even in a geological point of view. He has described seven hundred and twenty-two living species which swarm almost everywhere, even in the fluids of living and healthy animals in countless numbers. Formerly they were thought to be the most simple of all animals in their organization: to be in fact little more than mere particles of matter endowed with vitality; but he has discovered in them mouths, teeth, stomachs, muscles, nerves, glands, eyes, and organs of reproduction. Some of the smallest animalculæ are not more than the twenty-four thousandth of an inch in diameter, and the thickness of the skin of their stomachs not more than the fifty millionth part of an inch. In their mode of reproduction they are viviparous, oviparous, and gemmiparous. An individual of the *Hydatina senta* increased in ten days to one million; on the eleventh day to four millions, and on the twelfth day to sixteen millions. In another case Ehrenberg says that one individual is capable of becoming in four days one hundred and seventy billions! Leuwenhoeck calculated that one billion animalculæ, such as occur in common water, would not altogether make a mass so large as a grain of sand. Ehrenberg estimates that five hundred millions of them do actually sometimes exist in a single drop of water. In the Alps there is sometimes found a snow of red colour; and it has been recently ascertained by M. Shuttleworth that the coloring matter is composed chiefly of infusoria, with some plants of the tribe of *Algæ*. And what is most singular is, that when the snow had been melted for a short time, so as to become a little warmer than the freezing points the animals die, *because they cannot endure so much heat!* A specimen of *meteoric paper* which fell from the sky in Courland 1686, has been examined by Ehrenberg, and found to consist like the red snow, of *Conferve* and *Infusoria*. Of the latter he found twenty-nine species. Surprising as these facts are, it will perhaps seem still more incredible that the skeletons of these animals should be found in a fossil state, and actually constitute nearly the whole mass of soils and rocks, several feet in thickness, and extending over areas of many acres. Yet this too has been ascertained by the same acute Prussian naturalist.

#### "SPARE THE ROD, SPOIL THE CHILD."

A German magazine, some years ago, announced the death of a school-master in Suabia, who for fifty-one years had superintended a large institution with old-fashioned severity. From an average, inferred by means of recorded observations, one of the ushers had calculated that in the course of his exertions he had given 911,500 canings, 121,200 floggings, 209,000 custodies, 139,000 tips with the ruler, 10,200 boxes on the ear, and 22,700 tasks by heart. It was further calculated, that he had made 700 boys stand on peas, 6,000 kneel on a sharp edge of wood, 5,000 wear the fool's cap, and 1,709 hold the rod.

#### THE PARISH SCHOOLS OF SCOTLAND.—MORAL AND RELIGIOUS CHARACTER.

##### DEVOTIONAL EXERCISES.

The daily routine of exercises in the parish schools of Scotland, at the period to which I refer,—the early part of the present century,—was uniformly such as to favor the most salutary impressions on the young mind. The duties of the day commenced with prayer; and among the regular classes of the school, was always to be found one whose reading lessons were in the New Testament, and another whose lessons were in the Old Testament. One of these lessons followed the prayer.

##### THE BIBLE AS A CLASS-BOOK.

To the Scottish people, our mooted question, whether the Bible ought to be used as a class-book in schools, would, fifty years ago, have seemed a strange and most unaccountable one to exist in an intelligent Christian community. The worthy dominie, in particular, would have had very little respect for any such doubt or scruple. It would have seemed to him a fancy, or an absurdity. He would have asked, at once, how children were ever to learn to read aright in the devotional exercises of the family, if they did not receive the requisite training on the chapters of the sacred volume at school. He well knew that the peculiar style of expression in the Scriptures, and the many difficult proper names occurring in them, rendered a separate and frequent practice in Scripture reading indispensable.

Aside from the daily use of the Bible in the regular reading exercises of the classes, there was a time specially appropriated to reading

the Scriptures, as a volume of sacred history. Saturday forenoon was customarily devoted to this purpose; and all faithful teachers made it a point of duty to prepare themselves for this exercise, by extensive reading in books of commentaries, history, travels, antiquities, and whatever else might serve to render the weekly lesson instructive and interesting. Those teachers who were themselves students of theology, or licensed preachers, had it, of course, easily in their power to make the Bible lessons peculiarly attractive; and those who did not possess such advantages would, in many instances, make it a weekly practice, on their own part, to call at the minister's study at a convenient time, and obtain from the pastor or his library,—ever open to such calls,—the requisite aid.

The effect of the reverential regard for the sacred volume, and of the earnest desire to understand and treasure up its contents, which are so characteristic of the Scotch, was to render the Bible readings on Saturday forenoon a kind of sacred festival to both teacher and pupils, even to the youngest, who were, on that day, permitted to lay aside a portion of their accustomed lessons, and indulged in the delightful privilege of listening to the readings and explanations going on in the older classes. These explanations turned, it is true, chiefly on points of history, customs, manners, and scenery. But they were by no means limited to such topics. The faithful teacher omitted no opportunity to explain, where it seemed necessary, any spiritual truth, to enforce any moral injunction, or to comment on any instructive exhibition of Divine Providence. A thorough understanding and an early love of the sacred Scriptures, were thus infused into the mind and heart of childhood, and much done to produce one of the most prominent traits of the Scottish national character.

##### LESSON FROM THE CATECHISM.

Monday morning was regularly appropriated to hearing lessons from the Assembly's Catechism, unless in the case of such pupils as were excused from this exercise, on the score of their parents being dissenters of some communion which did not sanction the use of that manual. The lessons from the Catechism were meant to produce useful and salutary occupation for the otherwise unemployed hours of Saturday evening and the Sabbath day. But the teacher usually exercised his own judgment as to the age at which his pupils should commence such exercises, so as to secure, as far as practicable, a sufficient maturity of understanding for the profitable performance of them; and at the same time, to avoid laying on the tender mind a burthen too heavy for its powers, and thus producing an aversion to such employments.

##### SCHOOL DISCIPLINE.

The discipline adopted in the Scottish parochial schools, at the period to which I refer, was of a sterner character than is deemed necessary or appropriate at the present day. It depended, however, to a great extent, on the disposition and habits of the teacher individually; as parental interference, or opposition on the part of the pupils, was a thing never apprehended or experienced in the management of a school. An occurrence of such a character would have been generally regarded as bordering on sacrilege. The parent gave up his child unreservedly to the control of the teacher; and seldom, indeed, was this sacred confidence misplaced. Parent, teacher, and pupil, alike regarded education as a hallowed privilege, and instruction as a sacred office. This very circumstance precluded the necessity of recourse to harsh measures to subdue turbulence, or of extreme resorts to assert or maintain authority, or resent indignities. The current of control accordingly ran smooth, as did that of submission. Such, at least, was the ordinary course of things; and, in most cases, even the master who was severe in office, was regarded with reverence and awe, as only the more inflexibly just. Hatred or aversion to a teacher was nearly as rare among pupils, as among parents.

##### MORAL INSTRUCTION.

Another most effectual aid to the government of the Scottish schools was the high standard of moral influence which was uniformly aimed at in the daily business of the school. Familiar and affectionate conversation, aided by striking and impressive anecdotes, illustrative of the importance of moral and religious principle, was usually a daily resort. The sacredness of filial duty, the reverence due to parental authority, the sanctity of religious obligation, the indispensable necessity of the fear of God, and of devout regard to the authority of his word, as the only security for character and happiness, were daily interwoven with the topics of admonition from the lips of the teacher. The slightest deviation, in any case, from the laws of rectitude or of kindness, occurring in even the youngest classes of the school, would cause an instant suspension of the merely intellectual processes or instruction, as of inferior things which must stand aside till the higher claims of morality and of principle were duly attended to, and the occurrence presented to the whole school in all its relations to character and habit. The sternest sentence, pronounced or executed under such circumstances, was necessarily freed from vindictive violence or passionate ebullition, and the compassionate tones of the teacher, and