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THE MICROSCOPE AND MICROSCOPIC RESEARCH.

(From the Montreal Transcript.)

On Thursday evening, the 14th instant, at the Natural History Society Rooms, the Right Rev. Francis Fulford, D.D., in the chair, a lecture on the above subject was delivered before the Society, by Edward Murphy, Esq., of which we present the following abstract:—

The subject chosen for this lecture—the "Microscope and Microscopic Research"—is one of the most important and interesting to all; but previous to entering thereon, the lecturer claimed kind indulgence for any defects which might be found, and feared there were many, for some present might not be aware of the fact, that he was simply an amateur in Microscopy, amusing himself in leisure hours with its study, and making no pretensions to be either a savant or a professed lecturer.

The Microscope is justly considered one of the most valuable of modern scientific inventions, in consequence of the great discoveries made by it, and the important purposes to which it is applied, and it has added such a vast amount to our knowledge of the various changes and processes going on in the organic kingdoms, that it claims a rank of at least equal eminence with that of the Telescope, and indeed, in some respects, even surpasses it. The Telescope assists us to pierce the illimitable space above us, and there to discover those vast and magnificent series of suns, worlds and systems, of which our world and system are but the types, or what are supposed to be such, from analogies which we discern between them; but herein fails the telescope—that it does not enlighten us respecting the nature and constitution of those celestial bodies, nor the forms of animal and vegetable life (if any) which may be found upon them.—By the Microscope, on the other hand, the information which we derive of those atomic miracles by which we are surrounded is satisfactory and complete—it develops to our senses objects wonderfully minute, yet perfectly analogous to larger beings. It displays to us in a single drop of water a wonderful little world of animated beings more numerous than the sands on the sea shore. In a word, it reveals to us an animal, a vegetable, and a mineral kingdom, of which we were ignorant previous to its invention.

"Microscopic Research" has added a vast amount of information to almost every branch of science, as by the Microscope the student of nature is enabled to examine the delicate organizations on which animal and vegetable life depend, and with ease to detect the smallest structural differences; and in his analysis to define with certainty the structure of the most minute tissues. By it he discovers new laws of reproduction, new forms of being, and new functions in exercise; it enables him to penetrate the secrets of the earth and the ocean, and to examine the beautiful organisms he there discovers; it teaches him not to despise or think lightly of little things, as there is not a flower that breathes in fragrance and blooms in beauty, in garden or in field, not an insect that creeps the earth or flutters in the breeze; nor even a drop of water from a roadside ditch, that does not teem with beauty and with life—indeed, there is not a form which matter has assumed that will not yield some new idea to the diligent microscopic observer.

It would not attempt any description or history of the microscope, but contented himself with merely saying that it is only within a few years that this instrument has been raised from the condition of a mere toy to its present perfect state; and to such perfection have the scientific and practical opticians of the present day, especially those of England, brought the Microscope, and with such care and skill have they attended to the correction of the spherical and chromatic aberrations of the lenses, that it is said to work up to the theory of its construction; and Dr. Carpenter says, that "while it would be hazardous to deny the possibility of any further improvement, yet the statements of theorists as to what may be accomplished are so nearly equalled by what has been effected, that little room for improvement can be considered to remain, unless an entirely new theory shall be devised, which shall create a new set of possibilities." The "compound Achromatic Microscope" is therefore one of the most perfect instruments of scientific research yet invented and used by man.

To estimate duly the value of the Microscope to us, he first referred to a few of the misconceptions that prevailed prior to its introduction; before its invention, the Mite was considered the least of animated beings, and the existence of living atoms so minute, compared with which the mite may rank as an Elephant, had never been even conjectured, and very indefinite and erroneous opinions were held regarding the vital fluid in animals, and the manner of its circulation was imperfectly, if at all, understood. The fallacy of equivocal generation was universally maintained, and corruption was deemed the pa-

rent of Animal and Vegetable life. It would occupy too much time to name all the instances of misconception that characterized the times previous to the invention of the Microscope;—let these few suffice to show how limited was the sphere of human knowledge concerning many things which daily meet our eyes, and how unconscious were the philosophers of past ages of the wonderful creations that Science and Art were preparing to unveil by its means. This instrument possesses so many charms for us, and its uses and advantages to mankind are so manifold and various, that he offered no apologies for calling particular attention, at some little length, to a few of the principal discoveries made by it.

The Microscope has brought into existence a new and important science—that of Histology, or science of tissues—which has for its object the study of the elementary tissues of animal and vegetable life—both healthy and morbid.—Histological Anatomy is consequently an important branch of the education of the Medical Student. To the student of animal physiology this instrument reveals that animal muscle is composed of exceedingly fine fibres crossed by others more minute still; and that the cause of motion in animals, is produced by the relaxation or approximation of the cross fibres. This instrument has developed to him the anatomy of the human skin, and discovered the existence of the perspiratory pores—of which it is computed there are not less than 2,000 millions on the human body—indeed all the real knowledge he possesses regarding structural anatomy and the composition of the different organs of the human body, has been obtained by its aid.

The Microscope to the medical man is of incalculable value, as knowledge which could not be obtained by any other means, is by it acquired with facility. Observations made on blood, mucus, and pus, as well as the deposits arising from functional derangement, show him at once the affliction under which the patient is suffering, and tells him more, at a single glance, than could be obtained by many days' careful diagnosis in the ordinary methods; the microscope is therefore absolutely essential to medical science, and it is coming into very general use among the medical men of this city, as an auxiliary in their efforts to alleviate human suffering.

The Microscope has verified Harvey's great discovery of the circulation of the blood, as by its aid the vital fluid may be actually seen circulating in the web of a frog's foot, the tail or fin of a small fish, and in the larva of many aquatic insects; and we can witness no more wonderful and pleasing sight than that of the blood corpuscles coursing along rapidly through arteries and veins as small as the finest hair. The late Dr. Lardner thus describes a general view of the circulation of the blood in the tongue of a frog: "The observer," says the Doctor, "will be filled with astonishment at the magnificence of the spectacle, and to imagine a geographical map to become suddenly animated by their proper motions being imparted to all the rivers delineated upon it, with their tributaries and affluents, from their fountains to their embouchures, would give a most imperfect idea of this object, in which is rendered plainly visible, not only the motions of the blood through the great arterial trunks, and thence through all their branches and ramifications to the capillaries, but also its complicated tortuous motions in the glands, its return through the smaller veins, and its departure thence en route for the heart;" such is Dr. Lardner's eloquent description of that most beautiful and astonishing spectacle.

In Medical jurisprudence Microscopic aid has frequently been called in, and in some cases life has been saved by its means; in others, criminals have been brought to justice, as by it can be discovered whether blood stains found on their clothes are those of man or of some of the lower animals. He here remarked that the blood corpuscles in man, and in the mammalia generally, are rounded and flattened discs, while those of birds, fishes and reptiles are oval or elliptical, and vary in size according to the species.

The Microscope to the Zoologist is an indispensable auxiliary, as without it the structure and functions of many animals would remain forever unknown, and the very existence of many species would be still undiscovered. It reveals the important fact, that the minute structure of the bones of the four great classes of vertebrated animals, namely—Quadrupeds, Birds, Reptiles, and Fishes, differ from each other in so marked a degree, that should a fragment be found, either in recent or fossil state, on examination by the Microscope of the bone cells, he can at once discover the class of animal to which it belonged;—he is also enabled by the Microscopic examination of the dental structure of animals, even of those extinct for thousand years, to form a good idea of their general form and habits.

To the Entomologist the Microscope is exceedingly valuable, as by it he is enabled to study, and properly classify the various Insect tribes, and to examine the exquisite beauty found

in their formation and appendages, and their wonderful economy, as it reveals to him that these little creatures are possessed of the most beautiful mechanism in their frame work, have a nervous system, muscles, veins and other parts analogous to, and in common with the larger animals.

The Microscope to the student of vegetable Physiology and botany is an invaluable instrument, as it opens to him, and to the ordinary observer, a rich field of interesting observation,—for who has not lingered with delight amidst the beauties of a flower garden, or has not stopped to admire the foliage of the majestic Oak?—And to those who look with admiration on trees, plants and flowers, as they appear to the naked eye, it cannot be uninteresting to know that under these beauties he concealed formations so exquisite, that without the aid of this instrument, in developing them, we could scarcely be said to know anything of the hidden beauties of the Vegetable Kingdom.—It is also indispensable towards acquiring an accurate knowledge of the Cellular and Vascular tissues of plants. A thin section of a young shoot or branch of a tree displays under it a structure somewhat resembling, but far surpassing, the richest and finest lace work.

To the Antiquarian the Microscope has also lent its aid, as among other things, the long debated question, "whether the fine linen of Egypt in the time of Pharoas, was linen or cotton," is set at rest. It having proved that the fibre was cotton, and not linen as was long supposed.

The Microscope reveals to the Geologist the astounding fact that this World is but the wreck of ancient organic creations, that the vast limestone rocks, the great Coral beds of the Pacific, and even bog Iron ore, as well as immense layers of earthy matter forming extensive portions of our globe, and varying from a few inches to many feet in thickness, are but the catacombs of myriads of animal tribes too minute to be perceived by the unassisted eye—all of which were once in full and active existence, replete with life and beauty, ages upon ages ago. A noted example occurs on this Continent, namely—the strata of earth underlying the City of Richmond, Virginia; which has a thickness of from 15 to 20 feet, almost wholly composed of the agglomerated debris of microscopic animalcula. Our own Montreal limestone affords an example of what ancient organisms have contributed to form such masses of rock in other parts of the world. The Montreal, geologically called the Tranton limestone, has a thickness of about 400 feet.—An immense subject for contemplation? And yet immensity in its common impression on our minds, hardly conveys to us the idea of the myriads upon myriads of animalcula that have lived and died to have produced the Tripoli, the opals, the flints, the bog Iron ores, the ochres and the vast limestone and coral rocks of the world the organic structures of which is ascertained by their Microscopic examination.—The immense coal beds are, by the aid of this instrument, found to be the remains of a luxuriant and gigantic vegetation which flourished in past ages of the world, as by examination, not only can the woody fibre be discovered but even the most delicate of the vegetable organs, as the spiral vessels, &c., &c. By its aid the fossil botanist can determine the natural orders and genera of the fossil trees of former ages, whether they grew like the forest trees of this country by yearly additions to the outside, or by internal accretions like most of the trees of the tropics—its use is therefore indispensable to those who study the fossil flora of past epochs of this world.

By the Microscope—discoveries have been made regarding animalcula, which have brought vast accessions to our knowledge of animated nature,—the term animalcula is used to denote these living creatures inhabiting fluids, which are too minute to be seen by the naked eye—they are found in incredible numbers in both animal and vegetable infusions; a single drop of water may contain millions of these invisible creatures. And we find in this new world displayed a beauty and perfection, adaptation and reproduction far surpassing the objects with which we are familiar in every day life. Indeed the mind becomes almost overwhelmed and confounded whilst examining the internal structure, the modes of action, and the natural instincts of a living atom so minute, that a million of them aggregated together in a mass would present but little more than a sensible speck to the naked eye. Infusorial animalcula are astonishingly abundant; they are found in oceans, seas, rivers and lakes, as well as in stagnant ponds and ditches. They exist in the fluids of the animal body and in plants, and even in some of the most powerful acids. Professor Owen explains the use of the vast amount of animalcular life found throughout nature.—He says,—"Consider their incredible numbers, their distribution, and their voracity, and that it is the particles of decaying animal and vegetable matter which are appointed to devour and assimilate.—Surely we must in some degree be

indebted to these ever active and invisible scavengers for the salubrity of the atmosphere and the purity of the water." How strange to reflect that the same Omnipotent Being, who peopled infinite space with ponderous globes, has breathed a peculiar intelligence into these minute specks of matter, of which thousands should be thrown together before they could become perceptible to the most searching human vision.

The Microscope enables the chemist to discover, very minutely and completely, the changes of form and color effected by the test of fluids upon solids. By its aid chemical action opens an extended field, full of wonders, rich in beauties, and almost boundless in extent.—Microscopic Chemistry, therefore, extends very widely our range of philosophical enquiry, and serves to guide by the minute aspect of chemical change, to conclusions which have hitherto only worn the obscure character of conjecture.

The Microscope is also an invaluable assistant in detecting the process by which crystalline structures are matured, as it brings immediately under the eye of the observer the whole process of crystallization, from the primitive form of the most intricate combination which it ultimately assumes. And a more beautiful sight cannot be conceived than that which is presented, when any saline solution is suffering gradual evaporation, and the crystals begin to shoot and extend themselves over the field of the instrument, and if these experiments are conducted under polarized light, the effect produced is really gorgeous, for the splendid colours, and systems of coloured rings, produced by transmitting polarised light through transparent bodies that possess double refraction, are the most brilliant phenomena that can be witnessed.

The Microscope has made important and valuable contributions to the exigencies of social life, as by it can be detected the invisible ingredients which adulterate our food and drink, and even our medicines. For example, in suspected flour, the instrument enables us to judge of the size and shape of the starch grains, and their markings, and thus to distinguish the starch grains of the different kinds of meal.

The Microscopic examinations lately made in England, on articles of adulterated food, have been productive of much good.—Dr. Hassel stated before a Committee of the British House of Commons, that in his opinion "in nearly all articles, whether of food, drink, or drugs, adulterations prevailed, and that many of the substances employed in this adulterating process, were not only injurious to health, but were also poisonous."—Out of 34 samples of coffee sold in London, and Microscopically examined by him, 31 were adulterated with chicory, the chicory itself was also found to be adulterated. Tea and Chocolate were as bad, or perhaps worse. The tea was adulterated with turmeric, Prussian blue, china clay and other substances. The chocolates were found to be vile compounds, consisting of the most disgusting mixtures, of bad cocoa shells, old sea biscuits, bad flour and tallow. It has been also ascertained that drugs and pharmaceutical preparations are systematically adulterated, sometimes to such an extent as to render it impossible to estimate the strength of the remedies administered; and it is not out of place for us to ask—is not this infamous practice of adulterating and weakening drugs and medicines, productive of the most distressing consequences?

These Microscopic examinations of food and drugs have been followed by the most beneficial results, as the certainty of detection by this instrument, has doubtless prevented many dishonest dealers from following the nefarious practice of adulterating food and medicines. And the value of the Microscope is much enhanced from the fact, that by no other agency could some of these adulterations be discovered and exposed.

Time, he said, did not permit dwelling longer on the various ways in which the Microscope is of paramount importance to the Student as well as to the man of Science, and of charm and interest to the family circle around the domestic hearth, and to all who would cultivate their minds by possessing a store of interesting facts. But enough has been said to induce a belief in them, and to show that the Microscope aids very materially the studies of the Anatomist, the Physiologist, the Zoologist, the Botanist, the Geologist and the Investigator of organic and inorganic matter generally, giving, as it were, a new sense to man, thus adding to the enjoyments of life—and as our knowledge increases in proportion as we discover and contemplate the beauty, order, variety and perfection of the wonderful and exquisite works of the Almighty hand we should value the Microscope as having enabled us to extend our observations and thereby increase our happiness.

The lecturer concluded by observing that no single lecture however extended and carefully prepared, can be more than a very brief summary of "Microscopic research," and wonderful and startling as some of the statements which he

made might appear, their verification was within the reach of all, as with a Microscope of very moderate power, all he had described could be examined and proved; and if by means of his lecture any of his hearers were induced to explore the inexhaustible field which "Microscopic research" opened to them, he would be fully compensated for any little trouble which he had had in compiling and preparing it, and they would never regret having commenced a study so useful and fascinating as that which is afforded to them by the "Microscope and Microscopic Research."

At the close of the lecture many specimens, prepared by Mr. Murphy, of objects from the Animal, Vegetable, and Mineral kingdoms, as illustrative of parts of the lecture, were exhibited by the aid of a very powerful Oxhydrogen Microscope, and had a very pleasing, instructive, and beautiful effect. They consisted, in part, of Insects, and insect dissections. We would refer specially to the preparations of the respiratory system of insects, one slide of which displayed the entire breathing apparatus of the caterpillar; showing the two great tracheal tubes, with their numerous branches and the spiracles which admit the air into those tubes;—this preparation was exquisite, and was a study in itself. The slide, showing the stomach and gizzard of a cricket, was also a most interesting object. He exhibited preparations of the larva of several aquatic insects, illustrative of the great voracity of this class of animals—conspicuous among them was the "water devil," of which, judging from the specimen exhibited, it may be truly affirmed, that no similar creature is provided with weapons of destruction so powerful, so numerous, and so perfectly adapted to their end, as are those of this ferocious insect. There were also a number of slides, wings of butterflies and other insects; these were magnified enormously which brought out the rich colors and markings of them with very beautiful effect.

In the "vegetable kingdom" he exhibited several thin sections of wood, illustrative of the structure of exogenous and endogenous trees; also ferns and fernspores, showing the curious mode of fructification of those plants, mosses, dissected leaves, &c.

In the "mineral kingdom," there were many very interesting objects exhibited—the specimens of our Montreal limestone were exceedingly interesting to us, as the beautiful microscopic shells, of which it is composed were plainly seen. The slide of Egyptian limestone, showing the minute minute shells of which it is composed, was also a most interesting object—these limestone sections were ground thinner than bank note paper, in fact so thin that they were quite transparent, and thus revealing, by the microscope their organic structure.

Mr. M. also exhibited a number of other objects of very great interest, which want of space alone prevents us noticing.

The Right Rev. Chairman and John Teeming, Esq., on behalf of the audience, severally thanked Mr. Murphy for his very interesting and instructive lecture, and all left highly delighted with the evenings entertainment.

ST. PATRICK'S DAY IN NEW YORK.

LECTURE OF THE MOST REV. ARCHBISHOP HUGHES FOR THE CATHOLIC LIBRARY ASSOCIATION.

(THE CHARITY OF THE IRISH PEOPLE.)

(From the New York Metropolitan Recorder.)

Iring Hall was filled by a large and respectable audience, on Sunday evening the 17th instant, who assembled to hear the lecture, which it was announced would be delivered on behalf of the Catholic Library Association of this city, by the Rt. Rev. Dr. Lynch, Bishop of Charleston. The distinguished prelate left Charleston on board the steamer James Adger, on Thursday, the 15th, and would have arrived at this port on Saturday, but for the detention of the vessel by a gale while off Cape Hatteras. In consequence of the storm, which was unusually severe, he did not reach New York till the evening of the 18th inst. The lecture, as our readers have already seen from the heading of our report, was delivered by the Most Rev. Archbishop. Dr. Finnell having announced that the Archbishop had kindly consented to take the place of the Rt. Rev. Lecturer who was unavoidably absent, His Grace came forward to the front of the platform, and when the applause with which he was greeted had subsided, spoke as follows:—

Ladies and Gentlemen—You cannot expect from me on such brief notice anything like the lecture which would have been delivered by the distinguished and learned Bishop of Charleston, it something had not occurred on his way from that city to prevent his arrival. At the same time expecting him even for our Panegyric in the Cathedral, we waited and hoped for him till the last moment. So it has been here, and it is scarcely an hour since I felt impelled—however imperfectly—to represent him on this occasion.