slaps her in the face as it passes. "The Mushroom-Seekers," filling their flat, brown fishing basket on the rocky cliffs. In this last-named picture the flock of gulls dashing down on a shoal of fish in the middle distance is most lifelike. Mr. Hook is no mean colourist. All his pictures have a genial glow rare in modern art, and all are wholesomely redolent of tarred ropes, salt water, and sea breezes. Mr. H. Moore's canvasses gleam rather than glow. He also is a dainty colourist, though he seldom passes beyond the range of those grey tones of which he is such a master. For pictures in which sky and sea are painted with equal skill and in perfect harmony, and in which the lines of force in sea and cloud are made to contribute to a certain decorative quality in the whole composition he is *facile princeps*. In one now exhibited he gives us a splendid sky, with a most brilliant effect of light bursting out behind massive clouds and gleaming on the distant sea, in the "Silver Streak," from which the picture takes its name. In "Salmon-poachers" an effect of silver and salmon-coloured light in the sunset clouds streaming over the waves is most delicately painted. His finest picture is "Outside the Harbour," in which the abandoned, waterlogged, dismantled hull of the good ship "Fortune," drifts helplessly towards the shore, in a tremendous sea—the surf swirling and churning round her. The calm space through which she has just drifted is opaque with the thick foam of previous waves. A number of figures on the distant shore are just visible through the spray of the surges, which run high upon the beach.

Dudley Gallery, Winter Exhibition.—The present exhibition is about of average merit. If there be little of superior excellence, there is little that is utterly worthless on the walls. Among the figure subjects, Miss H. Montalbas' "Waiting for Beppo," a girl waiting on the canal-steps of a Venetian house, and Mr. F. Barnard's "An Autumn Manœuvre," a farmer, whip in hand, coming suddenly upon a boy munching his stolen apples, are about the best—the latter has real humour. Mr. J. B. Yeats and Mr. Pepys Cockerell contribute two good portraits, Mr. Yeats also exhibiting a well-painted single figure. Mr. Dollman's "Don't Care was Hanged," is a well conceived and painted study of jackdaws, cautiously approaching the hanging corpse of a comrade. There is no lack of good landscape, but nothing very remarkable. Mr. Knight's "Bit of Moorland," Mr. Munn's "Grey Day," and "Walls of La Houghe" (both somewhat French in handling). M. Parson's "Lock-keeper's Garden" (a charming subject); Mr. C. Johnson's "Manor House, Great Chalfield;" and Mr. Small's "Coast Studies," are good examples of what our landscape painters can do in various styles, as honest journeymen's work. Mr. Nettleship has a capital study of Antelopes; and M. Fontin two groups of flowers, painted with his usual power.

Institute of Painters in Water Colours, 53 Pall Mall.—The Winter Exhibition here is by no means a strong one. There is a great quantity of very poor work, chromo-lithographic in character. Mr. C. Green's very clever drawings for the *Graphic*, and some studies in black and white, from Victor Hugo's "Ninety-three," by various artists, are about the most striking things.

JOHN TODHUNTER, M.D.

TRINITY COLLEGE, DUBLIN.—Past members of the two principal College Societies, the Historical and the Philosophical, will be glad to learn on the authority of the President of the latter, as stated in his opening address, that an attempt is about to be made to amalgamate them on the plan of the Unions of Oxford and Cambridge. It may be mentioned that the late Provost, Dr. Lloyd, was anxious to have this effected, but the design was not carried out owing to some differences of opinion between the Committees of the respective Societies which, we are pleased to learn, have now been settled.

The Picture issued with the Christmas number of *The Graphic*, entitled "Out of Reach," is a reproduction in colours of the painting by Mr. P. H. Calderon, R.A. The reproduction is effected by means of the "aquatint process," which involves the passing of the sheets twelve times through the press, twelve different colours being employed.

An American who has been visiting the various colonies of art-students in Europe reports, that in addition to the large number of his countrymen working in Paris, and to respectable batches in Düsseldorf, Antwerp, London, and various Italian cities, there are a full hundred at work in Munich.

A new weekly paper entitled *The Town* is about to be published in New York on the plan of Mr. Labouchere's *Truth*.

A new edition of Moore's "Irish Melodies" will be issued early in the year by Messrs. Whittaker and Co. in their shilling "Familiar Quotations" series.

REVIEWS.

THE FORMATION OF VEGETABLE MOULD THROUGH THE ACTION OF WORMS, with Observations on their Habits. By CHARLES DARWIN, LL.D., F.R.S. London: JOHN MURRAY.

For long ages misunderstood and despised, and even maligned, by an ignorant humanity, that lowly annelid, the earthworm, has at length found an able and distinguished apologist in Charles Darwin. One may deny *in toto* the validity of the reasoning on which Mr. Darwin has founded his Theory of Development, or may cherish the deepest repugnance to that theory or doctrine on purely sentimental grounds, or because of its bearings on religion, and yet have no hesitation in taking up this latest work by the author of the *Origin of Species*. The Formation of Vegetable Mould through the Action of Worms, with Observations on their habits—that is the title of the work in full—contains, if we except one passage in the introduction, not a single allusion to Darwinism, nor does it seem to have even the remotest bearing on the theory to whose establishment the author may be said to have devoted his lifetime. Mr. Darwin, in fact, considers that the Theory of Development is already firmly established, as appears from the following passage in his introduction, where, replying to the objection that worms are too insignificant to produce the great effects attributed to their agency, he says:

> Here we have an instance of that inability to sum up the effects of a continually recurrent cause, which has so often retarded the progress of science, as formerly in the case of geology, and more recently in that of the principle of evolution.

Let us take first, as Mr. Darwin himself does, the second head of his title—Observations on the Habits of Worms. And at the outset a few words on the structure of the common earth-worm, of which the British species group themselves chiefly under the genus *Lumbricus*. It is not generally known, perhaps, that each of the hundred to two hundred rings or joints which make up what appears to be the perfectly naked body of the common earth-worm is armed with a row of minute reflexed bristles, obviously adapted to give the animal a purchase or anchorage in its motions, which are effected with equal ease in a backward or forward direction. And perhaps it would not be amiss to add that a gizzard, a set of lime-secreting glands, and a very complete and powerful digestive system are prominent items in the by no means imperfect organization of the Lumbricus. What senses does the earth-worm possess? is the first question Mr. Darwin proposes to himself in the opening chapter of his book; and this is immediately followed up by the still more difficult question—what sense or intelligence can we infer from the creature's actions. The Lumbricus has no eyes; is he then totally insensible to light? This question Mr. Darwin answers in the negative, and the record of the experiments which lead him to the belief that the earth-worm does really possess a sort of rudimentary optic sense, or rather a power of discriminating between light and darkness forms one of the most interesting passages in his work. Exposing worms kept in pots of earth for experimental purposes to the light of a candle or even a bright paraffin lamp, it was found that they were not usually affected at first.

Nor were they when the light was alternately admitted and shut off. Sometimes, however, they behaved very differently, for soon as the light fell on them they withdrew into their burrows with almost instantaneous rapidity. This occurred perhaps once out of a dozen times. When they did not withdraw instantly they often raised the anterior tapering ends of their bodies from the ground, as if their attention was aroused, or as if surprise was felt; or they moved their bodies from side to side as if feeling for some object. They appeared distressed by the light; but I doubt whether this was really the case, for on two occasions after withdrawing slowly they remained for a long time with their anterior extremities protruding a little from the mouths of their burrows, in which position they were ready for instant and complete withdrawal.

When the light from a candle was concentrated by means of a large lens on the anterior extremity they generally withdrew instantly; but this concentrated light failed to act perhaps once out of half a dozen trials. In all cases the duration of the light, unless extremely feeble, made a great difference in the result; for worms left exposed before a paraffin lamp or a candle invariably retreated into their burrows within from five to fifteen minutes; and if in the evening the pots were illuminated before the worms had come out of their burrows they failed to appear. From the foregoing facts it is evident that light affect worms by its intensity and by its duration.

From these facts alone, it is not evident that worms are sensitive to light. The facts, indeed, in the *prima facie* absence of any optic sense, would seem to prove rather a sensibility to heat than to light. But the following passage, which is not very happily placed, appears to be conclusive in favour of the inference that it is light and not heat to which the worms are sensitive.

It is only the anterior extremity of the body, where the cerebral ganglia lie, which is affected by the light, as Hoffmeister asserts, and as I observed on many occasions. If this part is shaded other parts of the body may be fully illuminated and no effect will be produced. As these animals have no eyes we must suppose that the light passes through their skins, and in some manner excites their cerebral ganglia.

The question now arises, is this sudden retreat of the worm under the stimulus of light a purely reflex action, a necessary consequence of the irritation of the cerebral ganglia and not dependent on the exercise of a will? Mr. Darwin decides that the action cannot be a reflex one, because, when the animal is absorbed in any occupation, stuffing the mouth of its burrow with leaves, for instance, the light has no stimulating effect on its organism. In short, the mind of the worm, or the worm's organism rather, for we must avoid begging the question by the use of that word, mind, is clearly unable to deal with two things at one and the same time; and this the organism should be able to do if it were controlled by no mind, but left free to respond blindly to outer influences. The worm, then, has the power of attention, a power which metaphysicians in general as well as the great mass of hum-drum folk who look on metaphysics as the threshing of chaff are unanimous in regarding as an attribute of mind. The reader of this page cannot read intelligently and carry on a coherent conversation at the same time, because his mind is intent on the page before him; the earth-worm busily stuffing the mouth of his burrow, to keep himself warm, as Mr. Darwin believes, cannot at the same time attend to the light-impressions affecting his cerebral ganglia, because his mind is already otherwise occupied.

The worm then has a mind; but it is not alone from this apparent exercise of attention by the animal that Mr. Darwin infers its mental power. He carries out a most elaborate series of experiments on the manner in which worms go to work in plugging the mouths of their burrows and observing that they act just as a man might be supposed to act in similar circumstances if he were to be turned into an annelid without any loss of mental power, he finds in the result of the experiments a strong corroboration of the conclusion already arrived at. We are much tempted to follow Mr. Darwin in detail through this intensely interesting series of experiments, and to show how the worms seize and draw into their burrows triangles of paper and leaves of various forms, not hap-hazard, but in a vast majority of cases in what humanly speaking seems to be the way best adapted to secure the object in view. But we have no space here to enter any further on this branch of the subject, and, no doubt, enough has been said to induce many to follow up the steps of the inquiry in Mr. Darwin's own pages.

Having thus briefly touched on the purely philosophic aspect of the study of worms, a few words must be devoted to a consideration of the latter portion of the book, dealing chiefly with what might be called the economic side of the question.

Worms have played a more important part in the history of the world than most persons would at first suppose. In almost all humid countries they are extraordinarily numerous, and, for their size, possess great muscular power. In many parts of England a weight of more than ten tons of dry earth annually passes through their bodies and is brought to the surface on each acre of land; so that the whole superficial bed of vegetable mould passes through their bodies in the course of every few years. . . . The plough is one of the most ancient and most valuable of man's inventions; but long before he existed the land was in fact regularly ploughed and still continues to be thus ploughed by earth-worms. It may be doubted whether there are many other animals which have played so important a part in the history of the world as have these lowly organized creatures.

This, in Mr. Darwin's own words, is the astounding result of his observations on the formation by worms of vegetable mould, that superficial layer of generally dark earth, in which the vegetative process is carried on. But how, it may be asked, is this vast result accomplished by agents individually so weak? Worms are omnivorous in a wider sense than that word generally bears. They feed by preference on organic matter, vegetable and animal; they are cannibals when the opportunity arises, and when no more toothsome food can be had they devour clay, extracting from it, as Darwin believes, that small percentage of finely divided organic matter, without which clay is seldom, if ever, found. In constructing their burrows, too, the Lumbrici, when they have pierced beyond a certain depth, can only progress downwards still farther by eating the clay in front, too closely compressed in the lower part of the stratum to be displaced by the body of the worm, as it is in its looser part near the surface. When we consider the vast number of worms at work, upwards of 53,000 being computed to exist in a single acre of land, and consider, too, the depth reached by the burrows, ranging so far as six feet in many instances, our minds will be prepared in some measure to appreciate the importance of the part played by the earth-worm in the economy of our globe. The fact that the whole superficial bed of vegetable mould passes through the bodies of worms in the course of every few years is rigorously demonstrated by the researches of Mr. Darwin. Careful measurements by weight of the rejected clay or castings thrown up by worms on a square yard of surface in the course of a year, and estimation of the rate at which loose stones, lime, and cinders spread out on fields as top-dressing subsided below the surface, always preserving their position as a horizontal layer, prove beyond all doubt the vast dimensions of the work done by worms.

We have said enough in these gleanings from Mr. Darwin's new book to show that the lowly earth-worm is entitled to a very large measure of our respect; and we confidently look forward for the coming of the day when its name shall have ceased to be used in the mouth of contemptuous man as a synonym for all that is despicable and loathsome.

ARABIAN POETRY FOR ENGLISH READERS. Edited with Introduction and Notes by W. A. CLOUSTON. Glasgow. Privately printed. 1881.

It will be a matter of regret with a considerable section of the public that this volume is not widely accessible. Those whose reading has led them to the study of the ancient literatures of the world will find preserved in these pages that freshness and brilliancy of fancy which is peculiarly associated with the oldest specimens of poetic imagination; and invariably grows less vivid as races advance in cultivation and power of complex generalisation. Captain Raverty's book, not yet forgotten, has thrown a flood of light upon the mental traits of the Afghans, and this work gives a hardly less complete insight into the characteristics of the Arabian Muse. Where the ordinary observer would least expect to find such things there may be discovered traces of a sentiment often chaster and more nervous than the modern school can show in even its most distinguished disciples. "An indescribable charm," says the compiler of the volume, quoting Sir William Muir, "surrounds the early poetry of the Arabs. Dwelling in the wonderful creations of their genius with these ancient poets you live, as it were, a new life. Cities, gardens, villages, the trace of even fields left far out of sight, you get away into the free atmosphere of the desert, and—the trammels and conventionalities of settled society cast aside—you roam with the poet over the varied domain of Nature in all its freshness, artlessness, and freedom." Although the volume is mainly a compilation from the translations of Sir William Jones, and the "Specimens of Arabian Poetry" by Dr. Carlyle, first published in 1796 and again in 1810, there have been new poems added by Mr. Clouston, and the notes appended give evidence of a vast amount of patient study. There is an Introduction also, which greatly adds to the value of the book. It sketches the history of the primitive Arabs, the "Mu'allâqat, or Seven Ancient Prize Poems," discusses the distinctive features of Arabic poetry, and finally summarises the state of the Arab literature under the Khalifate.

English Scholars have already some familiarity with the Seven Prize Poems through the translations of Sir William Jones, the first to direct the notice of the learned in Europe to the rich treasures contained in the literature of Hindustan, but their reproduction by Mr. Clouston will re-awaken interest in them, and we have no doubt that if the circulation of his work were extended beyond its present limited number, the reading public would be gratified. Chief among the specimens printed these poems must claim attention, and the biographical sketches of their authors increase their interest. Speaking of the whole group of poets Mr. Clouston says:—

The authors of the Mu'allâqat were all men of high poetical genius, although they were in no sense possessed of high literary culture—indeed it is almost certain that scarcely one of them could read and write. They were *natural* poets, whose ignorance of letters was fully compensated by a nice sense of rhythm and the faculty of clearly and vigorously expressing in their rich and copious language what they thought and felt; impulsive children of the desert, whose passions had free scope for good and evil; who were capable of the most intense affection, and of the most bitter hatred; whose strong feelings found vent in flowing verse.

There are certain peculiarities in common between these poems and the *Iliad*, if the theory be adopted that that poem is formed from the songs of the Rhapsodists, and that what Mr. Gladstone calls "the sun of all ancient literature," really does consist of "nebulous fragments." But the Seven Poems are not only various compositions. Their construction is irregular, and they consist of "short effusions and fragments strung together by various authors." It is not surprising to find that the authenticity of many passages is questioned. Mr. Clouston points out