3. — *Insectivorous Plants.* By CHARLES DARWIN, M. A., F. R. S. With Illustrations. New York: D. Appleton & Co. 1875.

WE have all been long familiar with the remarkable insect-catching properties of the North Carolina *Venus's Fly-trap* (*Dionœa muscipula*), and have looked with a curious interest at the pictures of its closed leaves with their chevaux-de-frise of marginal spikes, crossed over the body of a captured fly. This was generally regarded as a sort of singular accident, or at least as an exceptional phenomenon, quite peculiar to Dionæa; and beyond occasional speculations as to whether the trapped insects were utilized in any way for the nutrition of the plant, but little attention was paid to the subject, and it was not considered a matter of any great importance.

But for the last ten or fifteen years evidence has been accumulating among botanists that this occurrence is neither so rare nor so unimportant as was formerly supposed. The capture of insects by Dionæa, instead of being an occasional accident, is a constant and habitual phenomenon. Many different kinds of insects and other articulates are taken in this way. Dr. Canby, of North Carolina, collected fourteen leaves of Dionæa growing in its natural site, all of which had caught their prey, including altogether one fly, three ants, one spider, one centipede, and eight beetles. According to the observations of Dr. Canby, as well as those of Mrs. Treat of New Jersey, the same leaf will sometimes re-expand and capture a second or even a third insect, after disposing of the first. It is certain that the insects thus caught are not only employed for the nutrition of the plant, but that this is a main source of supply of the nitrogenous material required for its tissues. Similar facts have also been observed in other species of plants; and the capture of various kinds of articulate animals, in greater or less abundance, as a means of livelihood so to speak, is now fairly recognized as a natural phenomenon, not only in Dionæa, and in six or seven different species of Sundew, but also in Aldrovanda, Drosophyllum, Roridula, Byblis, Pinguicula, Utricularia, and Genlisea. It appears that these are in reality insectivorous plants. They possess certain organs of such structure and properties that they inevitably, in the natural course of things, attract, seize, and destroy their animal prey, as regularly and systematically as the spider captures his fly. In the case of Dionæa this is accomplished by the sudden trap-like closure of the irritable leaves. In other instances, as in that of the Sundew, the clasping movement is a slow one; but the insect is held entangled by a viscid secretion, and so gradually embraced by the bending filaments. Sometimes, as in Byblis, Roridula, and Drosophyllum, where there is no movement of the leaves, it is their viscid secretion alone which effects the capture, like so much bird-lime. In Pinguicula, there is both a viscid secretion and a movement of the leaves. Two of the species mentioned, namely, Aldrovanda vesiculosa and Utricularia vulgaris, are water-plants; they entrap, of course, aquatic animals, mostly crustaceans, worms, and various insect larvæ. In Utricularia, the capturing apparatus is an irregularly hemispherical bladder, provided with a sort of valve, opening inward. This valve the intruder easily pushes aside on entering; but it closes again and imprisons him securely when he is once in. Mr. Darwin found, on one occasion, as many as ten little crustaceans in a single bladder of Utricularia neglecta; and Professor Cohn, of the Institute of Physiological Botany at Breslau, after immersing a fresh plant of Utricularia vulgaris in water abundantly inhabited by crustaceans, found the next day nearly all its bladders containing captured prey.

Mr. Darwin's attention was first directed to the insect-catching properties of the Sundew in 1860. His very numerous and careful observations have accordingly extended over a period of several years; and their results are recorded, in a systematic form, in the present volume. All the plants now known or reasonably suspected to be insectivorous are described at some length, but the most elaborate and original portion of the book relates to the Sundew; and we shall confine ourselves mainly to the investigations of the author on this species and its singular habits of life. The method of observation employed, and the manner in which its results are given to the reader, form a model for investigations of this kind. Everything is both done and told with a precision which leaves nothing to be desired; and no one can read the book without a sense of genuine satisfaction, at acquiring a knowledge so definite and based upon data so clearly and accurately stated. A few examples may be selected from among many, to illustrate this feature, which is a prominent one throughout. In speaking of the movement of the leaf-tentacles, when excited by the contact of raw meat, the author says (page 24): —

"Another tentacle, similarly treated, distinctly though slightly changed its position in ten seconds. In two minutes and thirty seconds it had moved through an angle of about 45°. In five minutes it had moved through 90°. And when I looked again, after ten minutes, it had reached the centre of the leaf; so that the whole movement was completed in less than seventeen minutes and thirty seconds."

On page 236, after enumerating various trials to determine the mode of transmission of the exciting impulse through a leaf, he says: —

"In ten other experiments, minute bits of meat were placed on a single gland or on two glands in the centre of the disk. On eight of these leaves, from sixteen to twenty-five of the short surrounding tentacles were inflected in the course of one or two days. On the two remaining leaves, almost all the short tentacles of the disk were inflected."

While estimating the vigor with which the tentacles bend, under the influence of a stimulus, he says (page 254): —

"The exterior tentacles, considering their delicacy, are inflected with much force. A bristle, held so that a length of one inch projected from a handle, yielded when I tried to lift with it an inflected tentacle, which was somewhat thinner than the bristle."

The plant upon which most of Mr. Darwin's observations were made is the Round-leaved Sundew (*Drosera rotundifolia*). The corresponding American species, which bears the same name, if not absolutely identical with the English, resembles it so closely that it may easily be recognized from a description common to both. It is a low, perennial, herbaceous plant, growing in open upland bogs, and presenting a little cluster of five or six leaf-stems with rounded disk-like leaves, usually spread out in a nearly horizontal position. The leaves are provided, on their upper surfaces, with numerous, reddish-colored, gland-bearing bristles, or filaments, to which Mr. Darwin gives the name of tentacles, from their power of moving or bending, like the tentacles of an invertebrate animal. The gland situated upon the extremity of each tentacle is surrounded by a little globule of clear, colorless, viscid secretion; and these globules glitter in the sunshine like so many dew-drops, whence the name of the plant itself. Notwithstanding its unobtrusive appearance and delicacy of texture, the Sundew is probably as rapacious a destroyer of insects, in proportion to its size, as Dionæa. In a dozen plants collected at random, and bearing, in all, fifty-six fully expanded leaves, Mr. Darwin found that thirty-one leaves, that is, more than fifty-five per cent of the whole, had adhering to them dead insects or their remains. In one plant, every one of its six leaves had caught an insect. In many instances the same leaf had caught more than one; and in one case the remains of no less than thirteen distinct insects were found upon a single leaf.

The mechanism of the capture, in Drosera, is as follows: —

The insect, usually a small fly, attracted perhaps by the aspect or odor of the plant, alights near the centre of the leaf, upon some of the short tentacles situated at that part. Its feet are entangled by the viscid exudation; and as they sink into it, they touch, ever so lightly, the glands by which it is secreted. The central tentacles, with which the intruder first comes in contact, do not, as a rule, themselves change their position. But from them, as soon as their glands are stimulated by the touch of a foreign body, an impulse is sent outward, through the intervening tissues, to the longer tentacles about the margin of the leaf. These begin slowly to curve inward; and, by bending over from all sides toward the centre, they reach in succession the body of the insect, and at last close round him in a circle from which there is no escape. Each gland at the same time secretes more abundantly than usual; and the viscid fluid, which covers the insect, blocks up his breathing-pores, and no doubt kills him by suffocation.

This remarkable fact, of the transmission of a motor impulse from one part of the leaf to another, is one of the most important results established by Mr. Darwin's observations. The evidence of its reality appears to be unquestionable. The parts immediately endowed with the power of motion are the filamentous portions, or pedicels, of the tentacles. But these organs are not directly irritable; and a mechanical stimulus, applied either to their surfaces or their substance, does not cause them to bend. They were roughly and repeatedly rubbed, and bits of raw meat or other exciting substances were placed upon them at various points, without producing any distinct movement. Wounding the blade of the leaf with a lancet, or pricking it repeatedly with a needle, was equally ineffective. On the other hand, a bit of soft cotton thread, or, better still, a piece of human hair, or a fragment of pounded glass, weighing respectively from $\frac{1}{8000}$ to $\frac{1}{78000}$ of a grain, if placed in contact with one of the exterior *glands*, will cause its pedicel to bend through an angle of at least 180°. Small bits of meat were left for a considerable time on the pedicels without perceptible effect; but if they were then pushed upward, so as just to touch the glands, in a minute the tentacles began to bend.

Even here, the impulse which produces motion is transmitted through a considerable distance, amounting to nearly twenty vegetable cells placed end to end; for the part of the pedicel which actually bends is not that in immediate proximity to the gland, but the portion near its base. Throughout its upper two thirds the pedicel remains straight, or nearly so, and is only carried inward by the curvature of its basal portion. The fact of transmission is still more evident when the exterior tentacles become inflected without either their pedicels or glands being touched at all. If the central glands of a leaf be irritated by repeated contact of a stiff camel's-hair brush, the marginal or submarginal tentacles bend inward. Particles of meat, dead flies, bits of dried moss, cinders, or pounded glass, if placed on the central part of a leaf, are well embraced by its outer tentacles in periods varying from one to twenty-four hours. Consequently the impulse, in these cases, must have travelled from the central glands, down the whole length of their own pedicels, and across the intervening part of the leaf-blade, to the pedicels of the exterior tentacles.

Such a phenomenon at once recalls the transmission of motor impulses by the nervous system of animals; and it has been therefore assumed, in some quarters, that organs analogous to nerves, in structure as well as in function, must exist in the vegetable tissue. But this assumption is unwarranted by any direct evidence, and is quite unnecessary for a satisfactory explanation of the facts. When a motor impulse is transmitted, in the animal body, from one part to another, the nerve fibre which is the organ of communication is thrown into a state of polarity throughout its length, thus causing a visible contraction in the muscle where it terminates. This is the regular and physiological process by which during life the muscles are called into activity. But a muscular fibre may be made to contract experimentally, by an artificial stimulus applied to its own substance. Now, suppose the touch of a stiff hair or a bit of pounded glass to excite, in a gland of the Sundew, some change in the molecular condition of its contents. This change would produce no visible movement in the gland itself, because the tissue of the organ is not contractile; but it might cause a similar change in the contents of the next succeeding cells, and so on, reaching at last the base of an exterior tentacle. Here it meets with contractile tissue, and a movement consequently takes place. The contractile tissue of the pedicel may be excitable by a molecular change in the contents of adjoining cells, though not by a mechanical stimulus applied to its own substance; just as the fibres of the optic nerve, which are insensible to the direct action of light, may be excited to activity by a luminous ray falling on the retina. Many varied and elaborate experiments were performed by Mr. Darwin on the rapidity of this transmission of the motor impulse in Drosera, the direction which it follows in different cases, and the special tissues of the leaf through which it is effected; but the most interesting fact, in connection with vegetable physiology, is that of its existence.

The immediate mechanism of movement in the tentacles is not clearly understood; and the same may be said of the motions, whether excited or periodical, known to be exhibited by other plants. Notwithstanding the interest which attaches to these movements, and the repeated attempts at their investigation, in the leaves of the Sensitive plant and the Wood-sorrel, and in the stamens of the Thistle family, no fully satisfactory theory of their production has yet been reached. There is evidence that the movement is accompanied by increased or diminished turgescence of the cells in various parts of the moving organs; and it has even been demonstrated, in some instances, that fluids exude from the cells of the part which contracts and accumulate in those which expand. But is this fluid expelled under an active compression exerted by the cell, or does the cell wall shrink from its own elasticity because the fluids are discharged by a sudden action of exosmosis? Do the cells which are distended become so because they attract additional fluid by endosmosis, or are they simply receptacles, into which the fluid finds its way when expelled from other parts? It is just at this point that all explanations fail. Mr. Darwin is inclined to connect the power of movement in the tentacles of Drosera with another internal phenomenon, namely, that of "aggregation," so called; a remarkable conglomeration in distinct masses of the protoplasmic matter of the cell-contents. This aggregation takes place in the cells, both of the glands and their pedicels, simultaneously with the bending of the tentacles, and again disappears when the tentacles re-expand. The author suggests that the contraction of the cell wall may be due to an action of the same kind with that which causes aggregation in the albuminous contents of the cell cavity, namely, an approximation of its molecules. Still, this process is neither an indispensable requisite nor a determining cause of the motion, of the tentacles; since aggregation may occur, under some conditions, without movement, and movement may take place without aggregation. It is certain that the concave portion of a bending tentacle is in a state of active flexion, and is not simply pushed over by the turgescence of its convex side. Mr. Darwin on one occasion succeeded in snipping off with a pair of scissors the convex surface of an inflected tentacle; when the curvature of the remainder immediately became more pronounced, and went on increasing until it formed a complete circle. Neither in this case nor in any other was it possible to detect any wrinkling of the surface of the tentacle at the bending part, or of the cells in its interior; though they might be expected to show such a wrinkling if they were simply collapsed from an exosmosis of their fluids. After all, the only thing we really know of the contraction of the tentacles, so far at least as regards its mechanism, is that they contract. The tissues on the concave side are of course diminished in volume and those on the convex side are increased; but it is not evident how these changes in condition are effected, or in what way they are related to each other.

Although the tentacles are more or less stimulated to movement by any solid object left in contact with the glands, there is a great difference in the intensity of the action caused by substances of different kinds. The most efficient stimulants are those which contain nitrogenous organic material capable of being dissolved by the secretions of the plant; and of all these substances, raw meat acts with the greatest promptitude and energy. Thus particles of glass, coal-cinder, gold-leaf, cork or blotting-paper, though they sometimes became well embraced by the exterior tentacles, often acted irregularly, or caused only slight and slow movement; while minute flies or bits of raw meat, afterward placed on the same leaves, produced rapid and complete inflection. A similar difference of action was shown by nitrogenous and non-nitrogenous matters dissolved in water. Solutions of gum arabic, of starch, of sugar, olive oil, and even dilute alcohol produced no movement; the same leaves, in some instances, becoming afterward closely inflected, when treated with bits of meat. On the other hand, drops of milk, of albumen from the egg, of infusion of meat, mucus, saliva, and solutions of gelatine all acted with decisive effect. Altogether, trials with these nitrogenous fluids were made upon sixty-four leaves; out of which number sixty-three had their tentacles well inflected in consequence of the application. The influence of nitrogenous fluids is shown still more distinctly in the numerous experiments with watery solutions of the ammoniacal salts; since these substances act in surprisingly minute quantity and dilute form. The carbonate, nitrate, phosphate, and sulphate of ammonia were all tried, as well as several salts of ammonia and the organic acids. Of these substances, phosphate of ammonia was by far the most active, or at least produced a perceptible result when used in the smallest quantity; but all of them were extremely efficient in causing inflection of the tentacles. Thus there is a decided difference in action between nitrogenous and non-nitrogenous organic solutions. The former, as a rule, cause inflection of the tentacles, the latter do not. Mr. Darwin, however, enumerates, on page 78, among the non-nitrogenous liquids, infusion and decoction of tea-leaves, as well as solutions of theine, which he found to be inoperative. But theine is a nitrogenous substance, having the formula $C_8\ H_{10}\ N_4\ O_2$. We are at a loss to account for this curious oversight.

The most interesting fact shown by Mr. Darwin, next to the excitability of the glands and the movement of the tentacles, is that solid nutritious matters, placed upon the leaves, are actually *digested*. This is accomplished by means of an acid fluid secreted by the glands; a sort of gastric juice, produced, like that of animals, under the influence of the contact of digestible matters with the secreting organ. The secretion of the glands of Drosera, in their unexcited condition, is, as we have seen, viscid, transparent, and colorless. It is neutral in reaction, or only occasionally and faintly acid. The fluid surrounding the glands on thirty different leaves was tested with litmus paper; and in twenty-two of these leaves no perceptible acidity was present. In the remaining eight there was some evidence of an acid reaction, but this was exceedingly feeble and sometimes doubtful. The case is very different with glands which are excited by the contact of solid substances, either organic or inorganic. Fourteen leaves, in which the secretion was free from any perceptible trace of acidity, were treated, some with particles of broken glass, others with cubes of coagulated albumen, others with bits of raw meat; and when, after twenty-four hours, their tentacles had become more or less completely inflected, the secretion was found to be distinctly acid. The secretion becomes acid, not only on the glands at the centre of the leaf where the foreign substances are placed, but also on those of the marginal tentacles while yet in process of inflection, before they have reached the central part, and consequently before they have themselves touched the exciting substance. Thus the stimulus which causes secretion, as well as that which produces movement, may be transmitted from one part of the leaf to another, through the intervening tissues. Mr. Darwin testifies that he has tried "hundreds of times" the secretion on the disks of leaves which were inflected over various objects, and has never failed to find it acid. This reaction increases in intensity after the tentacles have remained for some time closed over a foreign substance.

The specific character of the acid thus produced was not fully ascertained. Various trials were made by Professor Frankland to determine its nature, but without complete success, owing to the small quantity obtainable for experiment. It was shown, however, to be neither hydrochloric, sulphuric, oxalic, tartaric, nor formic acid. The evidence on the whole indicated that it was probably an organic acid, similar in character to the acetic or the fatty acids.

The effect of the continued action of this acid secretion upon solid nutritious substances is that they become softened and dissolved, and the liquefied materials are afterward absorbed. The method used for investigating this point was similar to that employed in experiments with the gastric juice of animals. Small cubes of coagulated albumen, with their edges and angles sharply cut, were placed upon the leaves and examined at various times after having been clasped by the tentacles. After some hours their edges and angles were rounded off, the masses themselves being enveloped in a transparent fluid. In about two days they were often completely liquefied; and later still both the cubes and the fluid had disappeared. Bits of coagulated fibrin, of delicate areolar tissue, and even of cartilage, were affected in a similar way. Small pieces of roasted meat were softened and liquefied from the surface inward, the muscular tissue being gradually disintegrated and the fibres losing their characteristic transverse striations. As a rule, the albuminous and albuminoid substances, and digestible tissues composed of them, were found to undergo liquefaction; while the epidermic tissues, such as nails, hair, and feathers, and non-nitrogenous organic matters, such as solid fat, starch-grains, and cellulose, were unaffected, though left in contact with the leaves for four or five days. The acid secretion of the Sundew accordingly shows a striking analogy, both in its properties and action, with the gastric juice of animals, which is also acid, and which digests albuminous matters, but leaves starch and cellulose unchanged.

The analogy is carried still further by the fact that its acid reaction is essential to the digestive power of the Sundew secretion; and that this power may be temporarily arrested by neutralizing its acidity, and again brought into action by the addition of another acid. Solutions of carbonate of soda were used for the purpose of neutralizing the acid reaction, and dilute hydrochloric acid for restoring it. Cubes of albumen, which remained in the first case unaltered for twenty-four hours, were nearly or quite dissolved by the next day, after the secretion was again made acid.

Thus it appears that the plant not only seizes and holds animal matters brought in contact with its leaves, but it also digests them; that is, reduces them to the liquid form in which they are fitted for absorption. The author believes that the secretion by which this is accomplished resembles in all respects the gastric juice of animals; that it acts by virtue of containing a ferment like the pepsin of the gastric juice; and that, as he expresses it, the ferment in both cases is closely similar, if not identically the same.

This, we think, is doubtful. Indeed Mr. Darwin, in this part of his book, seems to have been led into a singular confusion with regard to the combined action of an acid and a ferment, and the experimental evidences of their existence. On page 94 he says: "The best and almost sole test of the presence of some ferment analogous to pepsin in the secretion appeared to be to neutralize the acid of the secretion with an alkali, and to observe whether the process of digestion ceased; and then to add a little acid, and to observe whether the process recommenced. This was done, and, as we shall see, with success."

And again, on page 96: "From these experiments we clearly see that the secretion has the power of dissolving albumen; and we further see that if an alkali is added the process of digestion is stopped, but immediately recommences as soon as the alkali is neutralized by weak hydrochloric acid. Even if I had tried no other experiments than these, they would have almost sufficed to prove that the glands of

Drosera secrete some ferment analogous to pepsin, which, in presence of an acid, gives to the secretion its power of dissolving albuminous compounds."

It is hardly necessary to say that these experiments do not prove in the least the existence of a ferment in the secretion of Drosera. They only show that the presence of an acid is essential to its digestive action, which is suspended if it be rendered neutral or alkaline. In the gastric juice of animals, the pepsin, or organic ferment, may be thrown down as a visible precipitate by the action of heat or of alcohol. The secretion, thus deprived of its pepsin, is powerless for digestion, though it may still be acid; and the pepsin-precipitate, when redissolved in water, will again exert its digestive power, if the solution be slightly acidulated. This palpable demonstration of a ferment in the gastric juice, as equally essential with its acid ingredient, is wanting in the case of the Sundew secretion. It might be difficult to carry out such an experiment with the secretion of Drosera, owing to the minute quantity to be obtained. Mr. Darwin cut off a large number of leaves which had been moderately excited by the contact of pounded glass, and obtained from them a watery extract of slightly acid reaction, which he tested by immersing in it cubes of albumen, to see whether they would be digested, but without success. He accounts for the failure by supposing that the secretion of the ferment requires a previous absorption by the glands of soluble animal matter; but, at all events, it was not obtained in this way. The only evidence for the existence of a ferment in the secretion of the Sundew appears to be the fact that this secretion will dissolve small quantities of solid albuminous matters; and these substances are digested, so far as we know in animals, only by aid of such a ferment. But this evidence is hardly more than inferential.

In point of fact, digestion by the gastric juice, in animals, is something more than a simple solution. The albuminous matters are not merely liquefied. They are chemically changed, and converted into a new substance, the so-called "albuminose" or peptone; and this substance is distinguishable from albumen or fibrin by definite characters. Coagulated fibrin, if subjected to the action of a dilute acid alone, with the aid of continuous warmth, will be softened and gelatinized, and after a time dissolved; but it is not converted into albuminose, and may be precipitated again by neutralizing the fluid with an alkali. On the other hand, if pepsin be present it undergoes a true digestion, and is no longer precipitable by an alkali. This is an essential feature of the digestive process, and is important for the nutrition of the animal. For if the digested matters in the stomach were simply held in solution by an acid fluid, when absorbed into the circulation they would be precipitated by contact with the plasma of the blood, which is alkaline. It is possible that in plants this necessity does not exist, since the juices of the vegetable parenchyma have generally or always an acid reaction.

All things considered, we cannot help thinking that the analogy between the secretion of Drosera and the gastric juice of animals, in Mr. Darwin's book, is too closely drawn. They are no doubt alike in function, so far as regards the disintegration and liquefaction of nutritious material. But their identity of composition is far from being demonstrated; and especially the evidence of an organic ferment in the vegetable secretion is very imperfect, as compared with that of pepsin in the gastric juice.

The whole subject of the capture and digestion of insects by plants is a most interesting one, and shows another remarkable relation between the two organic kingdoms. Insects suck the juices of plants, and lay their eggs in the leaves or under the bark, and so take their pay for services rendered in fertilizing the flowers. But plants also devour insects, and make up for their scanty roots or insufficient soil by absorbing albuminous matter ready made from the bodies of their victims. Do plants also feed upon each other? Mr. Darwin found that the Sundew leaves certainly injure seeds left in contact with them, perhaps by absorbing some of their organic ingredients. This is still more probable in the case of Pinguicula, or Butterwort; the leaves of which, by means of their viscid secretion, catch not only insects, but many leaves and seeds belonging to other plants. Several specimens, gathered at the same time, were found to have sixteen seeds, belonging to nine different species, adhering to fourteen of their leaves. Seeds of the cabbage and other kinds, applied to the leaves of Pinguicula, caused inflection and active secretion from the glands; and there was evidence, not only that the seeds were injured, and in many cases killed, but that the glands had absorbed from them some substances which were no doubt to be used for the nutrition of the plant.

The marauding habits of Drosera and other vegetables, so fully described by the author of "Insectivorous Plants," suggest another consideration in regard to insects which prey upon each other. The Sundew spreads out its sensitive tentacles in the air; and when some passing fly has alighted on its disk and become entangled in the secretion, they close over his body with mathematical precision and suck out its nutritious juices for their own benefit. The little ant-lion digs a circular pitfall in the live sand, and lies in wait at the bottom until some incautious intruder has found his way in; and, when his strength has been exhausted in vain struggles to escape, seizes and devours him. Is not the plan thus laid for capturing insect prey an inevitable result of the organization of the animal as well as of the plant; and is it not carried out by a sort of physiological fatality, as imperative in the one case as in the other?

4.—*Lorenzo de' Medici il Magnifico.* Von. ALFRED VON REUMONT. Leipzig. 1874. 2 vols. 8vo. pp. xxiii., 606; xviii., 604.

AT the close of the last century a Liverpool attorney published a life of the great Florentine banker, statesman, and poet, known in history as Lorenzo de' Medici, which has since enjoyed a popularity seldom reached even by works of far greater merit. The novelty of the subject, but even more the novelty of the treatment, contributed to make Mr. Roscoe's success as splendid as durable, both at home and abroad, for he may fairly be said to have introduced to the Italians one of their greatest men. In spite of many grave defects, this work will doubtless long remain one of the most entertaining historical monographs in the language. Its distinguishing feature is a judicious blending of the political, social, and literary elements of the period, producing a picture of great brilliance and interest, but which is to good history what Dubufe's Prodigal Son, for instance, is to good art. The utterly false conception which Mr. Roscoe conveys of his hero has already been fully exposed by Sismondi, and later by Villari * whose views have been reproduced by Trollope in his history of Florence, and the new methods of political and literary history have long ago outstripped a work, the best part of which is but second-hand and incomplete. The interest of the period itself remained, and continued the popularity of a book for which no better substitute could be found.

This interest has, if possible, increased of late years, as the importance of the Italian Renaissance for literature and art has been more clearly recognized, so that a new work on Lorenzo de' Medici could not have appeared at a more opportune time. Von Reumont's book fills the want long felt of an exhaustive treatise upon the political, social, and literary phases of Italian (and, in a more restricted sense,

* In his Storia di Girolamo Savonarola e de suoi tempi (2 vols. Florence: Le Monnier), of which there is an excellent translation by Horner in the History of Girolamo Savonarola and of his Times. 2 vols. London: Longman & Green, 1863.