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controversy have for their main object the fertilisation of one flower by the pollen of another. In pursuance of this object Mr. Darwin set himself to investigate, first, the structure and development of the flower of living specimens of several very British species—namely, to observe how impregnation was actually effected in each; thirdly, to make a similar structural investigation of the principal exotic forms; and, fourthly, to ascertain by experiment the method by which these also are in all probability fertilised. To these investigations Mr. Darwin brought all the resources of a most skilful microscopic dissection, of an unswerving and exact observation, of a sagacious experimentalist fertile in resources, of an entomologist versed in the structure and habits of insects, and of a modified judgment in interpreting obscure phenomena, and drawing from them correct conclusions.

"The result is a work so less remarkable for the novelty of its facts, and for the importance of their bearing, than for its being the first which correlates the structure with the functions of the floral organs of one of the largest and most common of the families of plants. It would not be difficult to suggest the strong reasons for examples of great interest taken from the work itself, but it would be incompatible with the limits of this Address, to refer to them so that the general conclusion to which Mr. Darwin arrives is, that all the forms, even the most grotesque, which the floral organs of *Orchidæ* present are directly and obviously of use, and that every structural and physiological modification, however minute, tends, with scarcely an exception, to ensure the fertilisation of the ovules of one plant by the pollen of another.

"Mr. Darwin's vast contributions to physiological science is entitled 'On the Two Forms, or Dimorphic Conditions, in the Species of *Primula*, and in their remarkable Sexual Relations.' The phenomena of these being two distinct forms of flower in the genus *Primula* has long been familiar to naturalists, but the real nature of the difference between them, and of their respective functions, were not understood." "Mr. Darwin first suggested that the relations between the forms might be sexual, and he has since, with accurate skill, instrumentally proved this to be the case. By a most searching investigation of a vast number of specimens of each form, in their native soil, as well as in species he found that in all the two forms presented, in their stigmatic surface, ovules, and pollen, essential differences, introduced by a single instance of transition between the distinct forms. By experiments continued for several years he proved that in this genus complete fertility is only obtained by impregnating a form by the pollen of the other, each species of *Primula* thus dividing into two sets of bodies, which cannot be called distinct sexes, for both are hermaphrodite; yet they are so in a certain sense, for they require reciprocal union to effect perfect fertility. This remarkable fact he is not yet known parallel. The cross-impregnation is effected by insects. The structure and habit of flower being such that one form cannot by this means be impregnated either by its own pollen or by that of a flower of its own form.

"In a subsequent paper Mr. Darwin has shown that in a species of the genus *Juncus*, which is also dimorphic, whilst the pollen in the two forms is absolutely indistinguishable, respectively, the stigmas differ but slightly and yet apparently important respect, the pollen of one form is inefficient when placed on the stigma of the other form. The generally received idea, that the impregnation of plants may be effected differently by insects, as by bees, is shown to be fallacious, plants being structurally adapted for the one or the other, and not indifferently for either.

"He has similarly investigated a still more complicated case in the common *Lithospermum officinale* of our ditches, which, as regards its flowers, is hermaphrodite, there being three instead of two sexual forms differing in the length of the tube of their two series of stamens and of their styles. In estimating the novelty and value of Mr. Darwin's botanical discoveries we should not overlook that they have all been obtained by the study of some of the most familiar and commonest of our native plants, and some of the best known and most readily proved cultivated ones.

"The Council have awarded a Royal Medal to Warren De La Rue, Esq., for his Observations on the Total Eclipse of the Sun in 1860, and for his Improvements in Astronomical Photography."

The President remarked, "Among those who have successfully cultivated this comparatively new department of astronomy, it may, perhaps, be fairly said that Mr. De La Rue stands pre-eminent. He has not only been successful in making the application of the photographic art, several instruments have made experiments in celestial photography, and some of these earlier than Mr. De La Rue; but no one, I believe, has devoted himself so systematically and assiduously to overcome the many difficulties which are met with in this branch of science, and no one has been so successful in the results which he has obtained, particularly in regard to the sun and moon, his photographic pictures of which bodies are sufficiently delicate in their details to admit of the most precise measurement. In no one who has not seen Mr. De La Rue's pictures of the sun, can form an idea of their exquisite sharpness and beauty of delineation. No doubt part of the superiority of these pictures is due to his employment of a reflecting telescope of exquisite defining power, the large mirror of which was figured by his own hands, and by peculiar machinery of his own construction. These facts, however, do not detract from the value of his scientific inquiry, which arose from outstanding clouds of depression in the very instruments, especially when, as usual, they are unaccompanied for the luminous and not for the chemical rays of the spectrum.

"The photographs obtained in the solar eclipse of 1860 have been discussed by Mr. De La Rue in his paper in the Philosophical Magazine and Transactions for 1862, forming the Bakerian Lectures. In this memoir, and in his reports on the progress of Celestial Photography in the volumes of the Royal Association for 1859 and 1861, Mr. De La Rue has fully described his progress and instruments, and has thus deposited the instruments of his art, by giving the full benefit of his long experience in the art, though even with this guidance no one can hope to attain to great proficiency in its practice without time, patience, and perseverance.

"The Council have awarded a Royal Medal to Mr. Arch Lockhart Clarke for his researches on the temperature of the Spinal Cord, in the Brain, and on the development of the Spinal Cord, published in five memoirs in the Philosophical Transactions, and in other writings. . . . One of those who, at former times, most signally advanced this department of anatomical knowledge was an early Fellow of the Society—the Thomas Wilson, whose elaborate Treatise on the Anatomy of the Brain was illustrated by drawings from the pen of no less eminent an Association, Sir Christopher Wren, also a Fellow, and afterwards President of the Society.

"One of the principal subjects of Mr. Clarke's investigation was the grey substance which forms the interior of the spinal cord. The nature of which this part assumes in different regions of the cord has been more exactly described and delineated, and the nature and arrangements of its constituent elements more fully examined and more clearly exposed than heretofore. Two substances or parts, composed of nerve-fibres, and previously undetected, have been shown to exist in the grey substance through nearly the whole length of the cord, and two others in a shorter extent. Moreover, Mr. Clarke was, as we believe, the first to point out that the central canal of the spinal cord is lined with epithelium, and he certainly first explained the true nature of the tissue immediately surrounding the cord, which has since been shown to be identical with the cerebral cortex. "The nature and conditions of the fibres of the nerve-cords after they enter the substance of the spinal cord have, as yet, been by no means fully made out; but Mr. Clarke's investigations have shed considerable light on that obscure point of anatomy, and amongst other observations of importance, he has shown that a part of the posterior or sensitive roots, in the lower part of the descending direction—an unlooked-for anatomical fact, which was afterwards strikingly shown by Brown-Sequard to be in harmony with the results of physiological experiments."

"The structure of the medulla oblongata, and the relation of its several tracts or divisions to the substance of the spinal cord, will not be forgotten, and the nature of the grey masses which are there suggested, and their connection with special sets of fibres and nerve-cords, have received both elucidation from the keen scrutiny and sagacious interpretation of Mr. Clarke. Mr. Clarke has also investigated the mode of the development of the medulla oblongata and the spinal cord.

"The Council have awarded the Ransford Medal to Professor John Tyndall, F.R.S., for his researches on the Absorption and Radiation of Heat by Gases and Vapours.

"Previously to the researches of Professor Tyndall hardly anything had been done in the way of an experimental determination of the absorption of radiant heat by gases and vapours. Studies had indeed been made of the radiation of atmospheric air in specially constructed apparatus in a length such as that of an ordinary room, while Dr. Franz came to the conclusion that a column of air only three feet long absorbed more than three-and-a-half per cent. of the heat-rays from an ignited gas. The accuracy of these results given, and inferred from his experiments on special metals, but it is only by the process of the calorimeter of Professor Tyndall's first memoir on the subject that the skill and patience can be appreciated with which the various sources of error were one by one detected and eliminated by him." After referring to Professor Tyndall's memoirs, General Sabine remarked—

"It may serve to show the difficulties which beset the inquiry, arising from the interference of disturbing causes, to state that two such experienced physicists as Professor Tyndall and Professor Knapton of Berlin, should have arrived at, and long persevered, in reaching conclusions respecting the absorption of radiant heat by air, and the influence of aqueous vapour. This led Professor Tyndall, in a third memoir, to consider three especially the case of aqueous vapour, which he had already treated in his two former papers. The result is that his conclusions have been so confirmed by repeated experiments on special salts, and by the complete harmony which they present with what we know to be true in other cases, that it seems impossible to doubt their correctness.

"The conclusion that the chief absorbing action of the atmosphere on sun luminous heat is due to the absorption of radiant heat by water, is a common and important bearing on meteorology, and has been applied by Professor Tyndall to the explanation of some phenomena which appear hitherto to have been imperfectly understood.

"In a fifth memoir, which may be expected to be published in a few days, he treats of other subjects, the penetrative power of the heat radiated from various forms, and shows that such heat is absorbed with especial facility by the gases which result from the combustion.

"Professor Tyndall concludes from his researches that, as a general rule, the capacity of a substance for absorbing radiant heat from a source of comparatively low temperature increases with the chemical complexity of its molecule; and he has given some remarkable instances in which the law is found to be true. Whatever may be thought of our ability to explain the law in the present state of our knowledge respecting the molecular constitution of bodies, the law itself is in my eyes highly remarkable."

## CARINTHIAN LAKE-DWELLINGS.

At the meeting of the Imperial Academy of Vienna on the 9th August last Professor Hockstetter gave a brief sketch of the results of his investigations of the lakes of Carinthia and Cariola in search of traces of pile-dwellings. In spite of the unfavourable circumstances presented by the great excess of water in the lakes during the past summer, Professor Hockstetter found evidence of pile-dwellings in four Carinthian lakes—namely, in those of Werd, Krutzbach, Reindorf, and Krotzbach, which, at certain periods, pile-works, post-holes, beams, and other objects were obtained. In the Krutzbach lake, which was the only one particularly investigated, traces of piles were visible nearly in the middle of the lake, where the water is usually from four to six feet, but was this summer at least four or twelve feet in depth. From the middle of the lake, a line of piles and other objects, such as had embedded fragments of skeletons, pieces of burnt clay and charred charcoal, and numerous fragments of shells of *Lucania*. Subsequently M. T. Ullrich of Klagenfurt obtained from the same spot a great quantity of black post-holes, with pieces of wood, and other objects, which, it would appear to have been pressed in between round sticks; he also procured a round piece of mica-which, a whetstone, and a fragment of stag's-horn. Professor Hockstetter has no doubt that we have here remains of very ancient date, and that, by carrying on operations at the proper season, these piles, and what their original structure and other details of the same kind, would be made to be discovered both in the Krutzbach lake and in the other localities indicated by him, just as in the Swiss lakes.