powerful hydrodynamic pressure before referred to, a very severe effect is produced, namely, complete arrest of the respiration and a slight fall of the central blood pressure, this causing a similar feeble fall in the peripheral blood pressure. A little later (5-10 secs.) than the arrest of respiration a remarkable rise in the blood pressure occurs, this rise continuing until the normal tension is exceeded. These observations prove beyond doubt that the first cause of death is not what it is usually supposed to be, and as taught in the text-books, namely arrest of the heart and syncope, since, as you see, the heart goes on beating although the respiration has completely stopped. Furthermore, if we quickly perform artificial respiration we obtain recovery from the otherwise fatal arrest.

This suggests very strongly that the police and persons who are trained in giving the first aid to the wounded should be taught that with a gunshot wound of the cerebral hemispheres, the proper thing to do is to employ artificial respiration rather than the giving of stimulants, &c. But, as you may well expect, the matter does not stop here, nor is it so very simple, because we find that there are certain conditions under which the secondary rise of blood pressure does not occur.

It is now quite evident that the fatal phenomena of the gunshot wound of the cerebral hemisphere is in the first instance cessation of the breathing, and I have now to indicate in detail how this is produced by the hydrodynamic disturbance evoked within the skull cavity by the energy of the bullet. It is perhaps necessary to first remind you that the upper part of the spinal cord or medulla oblongata contains the chief centre for the movements of respiration. I would also draw your attention to the fact that therein is also the centre of origin of the vagus nerve, which nerve has the power of slowing the heart. Thus there are two important centres in the medulla which are liable to be affected by changes of tension around them induced, as above stated, when the bullet traverses the cerebral hemispheres in a transverse direction. It may be that the centres are principally affected by the mechanical pressure of the explosive effect, but this latter of necessity produces a certain amount of anæmia of the nerve centres; some of the effect may also be produced by that condition too. Supposing that the artificial respiration has been properly carried out, and the respiratory centre is revived into activity, there is yet another condition to be overcome, without which the animal or person dies, and for a long recognised reason, namely, that the bullet having in its passage cut through various blood-vessels, blood is poured out within the skull, and consequently raises very severely the intra-cranial tension. This constitutes, as a matter of fact, a second cause of death, for under these circumstances the accumulated blood causes such severe compression, that it not only again paralyses the respiratory centre but also irritates the vagus centre, causing a marked slowing of the heart. The proof of the truth of this statement is given at once the moment we cut the vagi nerves, for if these are divided the heart immediately resumes its former rhythm. The next curves are to exhibit the increase in the intra-cranial tension, which occurs the moment the bullet enters the skull. The line drawn by the Marey's tambour shows a violent increase of pressure at the moment of shot (first or explosive effect) and a certain recoil therefrom, this recoil being directly changed for a steady increase in tension brought about by the secondary cause of death, namely, the hæmorrhage, of which I have already spoken. To treat such hæmorrhage only ordinary surgical measures are requisite, but these will be impossible if the activity of the respiratory centre has not previously been restored in the manner already indicated.

To sum up, the basis of scientific discussion of the nature and causation of the phenomena evoked by bullet

wounds of the cerebral hemispheres must rest on two principal factors—the velocity of the projectile and the development of hydrodynamic movement in the wet living tissues.

I am glad to have had the opportunity of laying before you the facts on a subject which combines the pleasure of pure physical research with the interest inseparable from the resolution of pathological problems.

GEORGE JOHN ROMANES.

ANOTHER of our not too numerous band of English biological investigators has been taken from us in the prime of life. The list is a heart-rending one, and its full share of sadness surrounds the fate of this last dear friend and companion. Garrod, Frank Balfour, Moseley, Herbert Carpenter, Milnes Marshall—all were younger at death than Romanes, and he only reached the age of forty-six just three days before he died. For some two years his friends have watched with anguish the progress of the disease—a condition of the arteries resulting in apoplexy—which has now ended his pain. Marvellous was the activity of mind and the eagerness with which he pursued his favourite discussions even to the day of his death. Nothing, perhaps, more touching was ever witnessed by those who knew and loved his kindly earnest nature than the calm conviction with which he realised that the hand of Death was laid on him, the pathetic smile with which he would say, as he puffed his cigarette, "Of course my life is only hanging by a thread, and I shall never be able to finish the experiments which would, I think, convince you."

George John Romanes was the son of the Rev. Prof. Romanes, and was born in Kingston, Canada, on May 20, 1848. He studied at Caius College, Cambridge, took honours in the Natural Sciences Tripos (1870), and was Burney Prize essayist in 1873. Having private means, he determined to devote himself to the study of psychology, which he proceeded to attack from two sides—that of physiology, and that of the doctrine of evolution. He further equipped himself for his task by mastering the teachings of modern writers on "philosophy." To contribute to a knowledge of the evolution of Mind was the ultimate aim of his numerous researches and discussions. He was fortunate as a young man in forming an intimate friendship with Mr. Darwin; and it was his ambition not merely to carry the application of Mr. Darwin's methods and principles into the great field of mental evolution, but also to strengthen and, where possible, supplement the Darwinian theory itself. Mr. Darwin assisted Romanes in this enterprise by leaving to him unpublished work of his own on "instinct" and similar subjects.

Romanes first became known to the larger public as a gifted and capable exponent of scientific doctrine by the lecture on "Animal Intelligence" which he gave in Dublin during the meeting of the British Association in that city in 1878. He was subsequently appointed Fullerian Professor in the Royal Institution, and gave numerous lectures both there and at the London Institution. He contributed a series of papers describing his researches on the nervous system of the Medusæ to the *Philosophical Transactions*, and was elected a Fellow of the Royal Society fifteen years ago. His literary activity was very great, and resulted in the publication of several large and well-known books, as well as in numerous essays and short articles of a controversial character published in the reviews and in this journal. His chief books are "Animal Intelligence," "Mental Evolution in Animals," "Mental Evolution in Man," "Jelly-fish, Star-fish, and Sea-urchins," "Darwin and after Darwin," and "An Examination of Weismannism." He had a keen love of public

discussion and a native skill in dialectic, which may sometimes have led him to seek too eagerly an argumentative triumph. But his writings bear evidence of the most extensive knowledge and of a conscientious examination of all sources of information, combined with independence of judgment and much subtlety of analysis. The high estimation in which his work is held may be judged of from the fact that all his books have been translated into French and German, and that the book on which he was engaged when the first symptoms of his fatal illness appeared—namely, that entitled “Darwin and after Darwin”—was published simultaneously in the United States and in this country under special conditions highly satisfactory to him.

Four years ago, in order to enjoy greater quietude and the facilities of the newly erected physiological laboratory of the University, Romanes removed from London and took up his residence with his wife and family in a fine old house in Oxford, facing the cathedral house of Christchurch. Here he has left his name and memory not only to be cherished by the numberless friends who mourn his early death, but to be carried forward to all future generations of Oxford scholars by the lectureship founded by him three years ago. Gladstone, Huxley, and Weismann have been the first three “Romanes lecturers” nominated successively by the founder. Hereafter it will be the duty of the University to elect annually a lecturer worthy to follow them.

Whilst it would be premature to claim for Romanes the merit of a great discoverer or originator in psychology or in the philosophy of evolution, it is nevertheless true that by his keen criticism, careful mastery of details, and great literary fertility, he has exercised a most important influence—stimulating the thought and research of others by his example and enthusiasm, and by those contests in the arena of the “reviews” with Wallace, Spencer, and Weismann, which have made his name so widely known.

It is not generally known, though a fact, that Romanes produced, in addition to his numerous scientific writings, a considerable volume of verse, which was printed for private distribution, as well as occasional poems. These poems deal with philosophic and emotional subjects, and are often of great beauty. It should be mentioned (although it is not possible here to record every fact of importance in his life) that Romanes was for some years honorary secretary of the Linnean Society of London, and a member of the Council of University College, London; he was Rede lecturer in the University of Cambridge, an honorary LL.D. of the University of Aberdeen, twice Croonian lecturer of the Royal Society of London, and Rosebery lecturer in the University of Edinburgh, when the courses delivered by him formed the substance of his book, “Darwin and after Darwin.”

One word before this too hasty notice is concluded as to his personality. His unaffected good-nature, and almost boyish simplicity and gaiety of character, endeared him to every man and woman with whom he came into contact. He has left behind him numberless friends, not one enemy.

E. RAY LANKESTER.

NOTES.

THE fourth volume of that very useful work of reference, the “*Minerva Jahrbuch*,” which goes to press in July next, is to contain an engraved portrait of Lord Kelvin. If the portrait is as good as that of L. Pasteur, which adorned the third volume, it will be well worth having.

WE regret to note the death of Dr. B. H. Hodgson, at the advanced age of ninety-five. He was elected into the Royal Society in 1877.

NO. 1283, VOL. 50]

DR. S. J. HICKSON, Fellow of Downing College, Cambridge, has been appointed Professor of Zoology in the Owens College, Manchester.

COLONEL LAUSSEDT has been elected an “Académicien libre” of the Paris Academy of Sciences, in succession to the late General Favé.

THE Société des Arts de Genève have opened a subscription list for the purpose of raising a fund to erect a bronze bust of the late M. Colladon somewhere in Geneva.

THE gold medal of the Linnean Society has this year been awarded to Prof. Haeckel, of Jena, for his important contributions to zoological science.

THE new buildings of St. Thomas's Hospital Medical School will be opened on Saturday, June 9, at 4 p.m., by the President, H.R.H. the Duke of Connaught.

A GENERAL meeting of the Federated Institution of Mining Engineers will be held in the rooms of the Institution of Civil Engineers on Thursday and Friday, June 7 and 8. Arrangements have been made for a visit to Messrs. Siemens Brothers and Co.'s works at Woolwich on Saturday, June 9.

AN international photographic exhibition will be held in Arnhem, Holland, from July 14 to 29. The exhibits will be divided into six classes, one of which will include scientific photographs. Mr. G. S. de Veer is the Secretary of the Exhibition Committee; his address is Velperwege 94, Arnhem, Holland.

THE annual meeting of the Photographic Convention of the United Kingdom will be held in Dublin in July. The President for the year will be Sir Howard Grubb, and the committee of reception includes, among others, the Earl of Rosse, Viscount Powerscourt, the Lord Mayor, and the Astronomer Royal of Ireland. The proceedings will open on Monday, July 9, with a reception and conversazione in the Museum of Science and Art.

IN these columns on March 8 and May 10, we noted the gigantic landslip that had occurred in the Gurhwal district in India, and blocked up the valley of the Bihri Ganga river. The disaster that was expected to result from this has happened. A Reuter's telegram reports that the dam has burst, and the immense volume of water that had been kept back has flooded the district, sweeping away villages, and causing the loss of about two hundred lives.

LAST year was a critical one in the history of the Zoological Society of Philadelphia. We learn from the twenty-second annual report that an effort was made early in the summer to raise a fund by private subscription for the purpose of meeting a large financial deficit. This, however, met with little success, and all hopes of saving the Garden of the Society had been given up, when the Commissioners, who hold the ground upon which the Garden is situated, asked from the City Councils a sum of 10,000 dollars for purposes of maintenance, in addition to the 5000 dollars which had for several years been granted. This sum was promptly voted, the Zoological Society placing in the hands of the Board of Education fifty thousand tickets for free admission of pupils of the public schools to the Garden. This liberal and broad-minded action has prevented the closing of the Garden and the dispersal of the collection.

IN the House of Commons, on Thursday last, Mr. Strachey asked the President of the Board of Agriculture whether it was proposed to repeat the experiment of transmitting the weather forecasts to telegraph offices in rural districts, for exhibition