

sphere of molecular action was measured exactly. A number of physical problems were treated, with which in England Lord Kelvin, the late Prof. Clerk Maxwell, Prof. Reinold, Prof. Rücker, Lord Rayleigh, and others have also occupied themselves. The criticism therefore seems not justified.

I know very well that in Germany several representatives of the descriptive natural sciences do not agree with my views about the structure and the movement of protoplasm. For instance, Prof. Pfeffer¹ reproached me with "having, without deducing my views from admissible foundation on experience in organism, exclusively constructed them by physical experiments, and thereupon demanded, in an unwarranted manner, a periphtric oil-layer for protoplasm."

Here, too, let me remark, that I concluded the existence of this periphtric oil-layer from the globular form of the surface of protoplasm in plasmolysed cells and that I tried for months to find in living cells the characteristic periodic spreading, suspected by me, on the inner side of the hypothetical oil-layer. I have several times observed this spreading and the destruction of the globular form caused thereby. The observations of living cells have led me to fresh physical experiments, which I published in the year 1888, together with my theory of the structure and movement of protoplasm. These theories I have always found corroborated in the continuation of my researches since 1888. My adversaries, on the contrary, have as yet not given a satisfactory physical explanation for the above stated phenomena, the globular form of protoplasm surface and the movements in the vicinity thereof. Up to the present day I believe my views to be correct and irrefuted.

The facts observed and the physical conclusions inferred by me, may appear extraordinary and not very intelligible to another science, but they are none the less correct and useful. Biological science must, well or ill, take into account the fact that the development of the cell and the life of the organic nature depends on masses and layers which cannot be perceived by the microscope alone.

Heidelberg, October 22.

GEORG QUINCKE.

Human and Comparative Anatomy at Oxford.

In the article which appeared in your last number under the above heading, expressions occur which may, I think, lead to misconception as to the position of the department of Human Anatomy. It is of such importance in the interest of scientific medical education that the academical teaching of human anatomy should *not* consist merely in "technical training in anthropotomy," that I cannot allow the statement that the teaching of the subject in Oxford is of this nature to pass without comment. Had the writer of the article in question taken the trouble to inquire of the University lecturer here, or of any of the University professors of human anatomy elsewhere, for instance at Cambridge, Edinburgh or Dublin, or had he consulted any of the leading text-books of the subject, he would have found that its scope is much more extended than he supposed. The misstatement having been made, however unintentionally, must be corrected.

Let me add that the department, which was founded in 1885, was not connected in its origin with the department of Comparative Anatomy, and has had no relation whatever with it since.

J. BURDON SANDERSON.

Asymmetrical Frequency Curves.

OWING to the haste with which I looked through the proof of my letter in last week's NATURE (p. 615) two slips escaped me, which I hasten now to correct. The ordinates in the diagram should have been marked $\frac{a\beta^n}{c}$, $\frac{a\alpha\beta^{n-1}q}{c}$, $\frac{a\alpha(n-1)\beta^{n-2}q^2}{1.2.c}$,

&c., the factor $\frac{1}{c}$ having been dropped. Further, the value for c should have been

$$c = \frac{\sqrt{2(\lambda\mu_2 - \mu_1)\mu_3 + 3\mu_3^2}}{\mu_2\alpha},$$

my α having been converted into a square power.

The method applied to Dr. Venn's curve fits it with an accuracy only surpassed by the generalised probability curve itself.

KARL PEARSON.

University College, October 28.

¹ Pfeffer, "Zur Kenntniss der Plasmahaut und der Vacuolen" (*Abhandl. Leipzig, Akad. math. phys. Klasse*, 1890, xvi. p. 279).

Telegraphy.

AS already stated in my previous letter, I have discussed this subject in my recently published "Examination of Weismannism" more fully than in NATURE. If "M. D. H." (NATURE, October 19) will consult the reference given in that letter to this work, he will find the facts to which he directs my attention are there given, together with certain reasons for concluding that they do not materially affect the point in question.

Hyeres, October 26.

GEORGE J. ROMANES.

AN ORNITHOLOGICAL RETROSPECT.

DURING the year 1892 there were at least three publications which are of great value to ornithologists, though from somewhat different points of view. They are Prof. St. George Mivart's little work on the "Elements of Ornithology,"¹ Dr. Gadow's "Classification of Birds," published in the Proceedings of the Zoological Society, and Capt. Bendire's "Life-Histories of North American Birds."

To thoroughly appreciate the value of Prof. Mivart's "Elements" one has to be the curator of a museum. Many people, like myself, must have been puzzled by the frequent demand for an elementary, but comprehensive book on birds, such as a man can carry with him on his travels, and many people about to journey abroad have asked me for a small book which would explain to them what certain birds were like. I prophesy that Prof. Mivart's book will make many collectors, and its handy size is one of its best features. There have been many introductory works on ornithology published in this country and America, notably those of Prof. Elliott Coues, but nearly all of them are too bulky, and that is the fault with the most popular works, such as the "Standard Natural History" and Cassell's "Popular Natural History." Commencing in an easy and unconstrained manner, Prof. Mivart in his Introduction leads his pupil on through the various forms of bird-life, his object being not to weight the tyro with too heavy material for study at starting. All the leading Avian types are passed in review and they are illustrated by some admirable woodcuts by Mr. Keulemans, drawn especially for the work. It is, therefore, possible for any one to understand what a particular form of bird is like, the only drawback to this mode of illustration being the impossibility of illustrating the subjects on the same scale, so that some of the smaller forms appear to be larger than they really are in comparison with the bigger birds. This was, however, unavoidable.

Three chapters (pp. 134-234) are devoted to the anatomy and osteology of birds, and a fifth chapter deals with their geological and geographical relations (pp. 235-250). That on the "Classification of Birds" summarises the chief characters for each order, sub-order, and family, and lastly there is an enumeration of the genera with the number of species in each. This is of course mainly derived from the British Museum "Catalogue of Birds," and I find that on adding up Prof. Mivart's figures, the number of known species is 11,900. The last time that a computation of the number of birds was made was in 1871, when the late Mr. G. R. Gray finished his "Handlist of Birds," and admitted 11,162 species as then known. This was probably a correct estimate, as I have generally found that the "Handlist" contained about enough false species to counterbalance the number of species described since the work was issued. For similar reasons, Prof. Mivart's estimate of 12,000 species will turn out to be approximately correct, and then by adding the number of species described since his book was published, and others discovered since the issue of the "Catalogue of

¹ St. George Mivart, "Birds: The Elements of Ornithology." 8vo, pp. vi.-329. (London, 1892.)