Letters to the Editor

The Editor does not hold himself responsible for opinions expressed by his correspondents. He cannot undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.

NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 166.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

The 'Thumb' of the Giant Panda

SOME reference has been made in the daily Press, during the past few days, to the extraordinary grasping power possessed by the giant panda at the London Zoological Gardens. It has been stated that "It is now seen that the fingers are used in conjunction with a thumb on each hand to grasp the bamboo. The thumbs are not tapered like the fingers. They are broad stumps, but they are connected with adductor muscles, by means of which they can be brought into contact with the fingers".

True opposable thumbs, capable of grasping, are possessed only by animals that have never ruined their grasping arboreal hands by using them to support the body weight in terrestrial pronograde progression. The giant panda is apparently a non-arboreal, quadrupedal pronograde, and should it have retained a truly opposable thumb, it would be a very remarkable circumstance: should it have re-developed an opposable thumb (for the purpose of grasping bamboo shoots) from one that had lost its structural basis of opposability, it would have performed a miracle. Not even the giant panda could be expected to reverse structural evolution to the extent of making an opposable, grasping thumb from one in which all the structural adaptations to this functional end had been lost. But the giant panda has done something that is almost equally remarkable. It has developed a new and thoroughly efficient pseudo-thumb. For the 'thumbs' which are 'broad stumps' are not thumbs at all, though they have attained, with great perfection, to their functional role. In addition to the pseudo-thumb, there is a true first digit, followed by four other digits: and the true thumb is in no way differentiated from (but is smaller than) the rest of the digits.

Upon the radial side of the carpus, there is developed in many mammals a sesamoid bone corresponding to the pisiform upon the ulnar side. In the true bears, the radial sesamoid is a small nodular mass; in the giant panda it has been developed into an elongated bone articulating with the scapho-lunar and projecting from the radial side of the hand after the fashion of a true thumb. Moreover, many of those muscles, which in normal mammals are inserted to the first digit, gain their insertion, in the giant panda, into the radial sesamoid, which thus usurps the place of the true thumb and simulates all its movements. The anatomical details of this curious adaptation will form the subject of a communication to the Zoological Society of London, to the authorities of which I am indebted for the opportunity of dissecting the fore-limb of this animal. In the meantime, it seems worth while to record this curious example of adaptation, by which an animal in which the thumb had lost its structural modifications for opposability and general mobility, has created a new and extremely serviceable 'thumb' in response to a

special need in its economy. It would seem that what is commonly known as Dollo's Law of the Irreversibility of Structural Evolution was sufficiently rigid to make the creation of a new mobile thumb an easier matter than the remodelling of one that had lost its original structural adaptation to mobility. But it is surely a very definite triumph that the giant panda has been able to make so perfect a new thumb as to deceive those who have admired the perfection of its grasp.

FREDERIC WOOD JONES.

Department of Anatomy,
University,
Manchester.
Jan. 17.

The Electronic Charge

WE have made modifications in the drop method for measuring the electronic charge, e , which enable a higher degree of accuracy to be obtained.

The method is also convenient for measuring the number of elementary charges, n , which are carried by a drop when it is detached from a volume of oil. Results of such measurements are given below.

The method used is that of H. A. Wilson, modified by (1) the use of a horizontal electric field; (2) recording photographically the motion of the drop.

Following Millikan, to reduce the evaporation of a drop, one of oil is used. The drop moves in air between the vertical plates of a condenser. During the first part of its motion it is acted upon only by its weight; then an electric field, X , is established, and a horizontal force, neX , acts too on the drop. If v is the vertical, and u the horizontal component of its velocity, and if Stokes's law applies, then

$$ne = k\mu^{3/2}v^{1/2}u/X,$$

where $k = 9\pi\sqrt{2}/\sqrt{g(\rho-\sigma)}$, and μ is the viscosity of the air at the temperature of the experiment. This value of e requires correction, according to the method devised by Millikan, to allow for the departure from Stokes's law.

The drops of apiezon and castor oil used have had a diameter, $2a$, of 0.0002–0.0010 cm. They are illuminated by a carbon arc with a dark-ground condenser designed for the purpose. The exposure is 0.0008 sec. at intervals of 1/25 sec. A low-power microscope objective and a fine-grained photographic plate is used. An example of a photograph obtained is reproduced in Fig. 1.

With this method, displacements correct to about 0.00003 cm. can be measured, and if the velocity is 0.3 cm./sec., intervals of time measured are correct to 0.0001 sec. It enables the velocities of drops to be measured which, on account of their large radius, move too quickly for accurate visual observation. For these drops, the correction factor to Stokes's law