Now, however many features the "total morphological pattern" may comprise, each is considered separately before it is compounded with the rest. It is a useful precaution, therefore, to be certain that the metrical attributes which are used in building up distinctive constellations of characters are accurately stated. Unfortunately, the three to which Prof. Le Gros Clark refers in his letter are not.

"Small" and "big" are qualitative words which acquire exact significance in relation to some given standard. Prof. Le Gros Clark does not tell us what the standard is; but he is, in fact, repeating the observations of Broom, Dart and others who have written about the teeth of the Australopithecinæ, and all of whom have emphasized the view that the teeth to which he refers are smaller than the corresponding one of existing anthropoid apes. In fact, proper numerical comparisons show this view to be incorrect, in so far as the extent to which the recorded dimensions and indices of the fossil teeth in question diverge from the means of one or other existing species of anthropoid ape is in most cases no greater than the extent to which, say, one chimpanzee in twenty will on an average diverge from the mean of its species, and in no case greater than the extent to which one great ape in fifty would diverge from its species-mean.

The most extensive set of data about the size of the teeth of the Australopithecinæ are given in the 1946 monograph published by Dr. R. Broom[4], and in a second monograph on *Plesianthropus* which has just appeared[5]. The claim (e.g., Senyurek[6]) that the upper lateral permanent incisor of *Plesianthropus* is smaller than that of the living anthropoids and that in the extent of its reduction it parallels later stages of human evolution is not borne out by adequate comparisons. The tooth is not significantly smaller than that of the modern female gorilla, and very little, if at all, smaller than that of the female orang-utan. The lower first permanent incisor of *Plesianthropus*, again, does not deviate in size from the female chimpanzee, the female gorilla, or the male or female orang-utan. The lower second incisor does not differ significantly from that of either sex of gorilla, or from the male orang.

The claims that have been made by Gregory and Hellman[7], Broom[4,5] and Senyurek[6] about the small size of the upper and lower canines of the Australopithecinæ are again not borne out by proper comparisons, for neither the upper nor the lower permanent canine diverges significantly in its proportions from that of the adult chimpanzee.

Lastly, contrary to Prof. Le Gros Clark's belief, the milk canines of *Australopithecus africanus* and *Paranthropus robustus* do not differ "in shape and dimensions, relative and absolute" from the chimpanzee, while that of *Paranthropus crassidens* does not deviate from the orang.

In so far, therefore, as these metrical attributes are not as Prof. Le Gros Clark describes them, the "total morphological pattern" is not as one would infer it to be from his account.

These matters of fact, which are fully elaborated elsewhere[8] (and not broad questions of primate phylogeny, about which, to the best of my knowledge, Prof. Le Gros Clark and I share the same views), were the reason behind the communication on which Prof. Le Gros Clark commented. His letter thus directs further attention to the essential need for a biometric and statistical approach to the comparative study of Primates, unless, of course, there is some other line of attack which can replace exact methods of osteological and odontological study.

S. Zuckerman

Department of Anatomy,
Medical School, Hospitals Centre,
Birmingham 15. June 24.

[1] Clark, W. E. Le Gros, *Nature*, **165**, 893 (1950).
[2] Zuckerman, S., *Nature*, **165**, 652 (1950).
[3] Clark, W. E. Le Gros., *Quart. J. Geol. Soc. Lond.*, **105**, 225 (1950).
[4] Broom, R., and Schepers, G. W. H., *Transv. Mus. Mem.*, No. 2 (1946).
[5] Broom, R., Robinson, J. T., and Schepers, G. W. H., *Transv. Mus. Mem.*, No. 4 (1950).
[6] Senyurek, M. S., *Ann. Transv. Mus.*, **20**, 293 (1941).
[7] Gregory, W. K., and Hellman, M., *Ann. Transv. Mus.*, **19**, 339 (1939).
[8] Ashton, E. H., and Zuckerman, S., *Phil. Trans. Roy. Soc.*, B (in the press).

A Joule Museum at Manchester

The support of the University of Manchester and the British Society for the History of Science has been secured for the arrangement of a small museum to commemorate the work of James Prescott Joule, the discoverer of the Law of Conservation of Energy. Besides showing various original instruments and documents which belonged to Joule, it is planned to display reconstructions of the main apparatus used by him in his investigations, and other material illustrating the early history of the discovery.

I should like to appeal to any person or institution in possession of documents, letters or unpublished information concerning Joule, to get into touch with me. I am also interested in any material pertaining to the early relations between Joule and William Thomson (later Lord Kelvin).

L. Rosenfeld

Physical Laboratories,
University,
Manchester 13.

Phosphorus in Peripheral Nerve

In a letter published in *Nature*[1], certain observations were quoted on the longitudinal distribution of phosphorus in the sural nerve. Recalculation gives phosphorus contents which do not, in many cases, agree with the previous calculations.

The following are the re-calculated figures.

(1) In nerves stimulated *in vitro* at the distal end, the mean difference between the phosphorus content of the proximal and distal ends is 73 ± 33 μgm./100 mgm. (eleven nerves), and in four cases the distal phosphorus content is greater than the proximal.

(2) In nerves stimulated *in vitro* at the proximal end, the mean difference between the ends is 92 ± 49 μgm./100 mgm. (eight nerves), and in three cases the distal phosphorus content is greater than the proximal.

(3) In fourteen resting nerves the mean difference between proximal and distal ends according to the previously published figures is 4 ± 15 μgm./100 mgm. The recalculated figures show the difference as 6 ± 27 μgm./100 mgm.

As the differences in the stimulated and resting nerves are not significantly different, the conclusions drawn in the paper are not valid.

Gilbert Causey

Department of Anatomy,
University College,
London, W.C.1.

[1] Causey, G., and Werner, G., *Nature*, **165**, 762 (1950).