

tion of  $\phi'$  has almost entirely to be considered in 2. It is this which constitutes the chief difference between the sliding and the fixed seat, and which accounts for the sense of fatigue experienced in the legs in the former system.

If we examine the problems which arise from the consideration of Fig. 1 we shall find that in using the term "fixed seat" we are speaking incorrectly; that is to say, as far as there exists a force to hold A in position we have none but friction; and that practically the position of A with regard to L is determined by muscular action.

Thus in Fig. 2 the seat is really more fixed than in Fig. 1, or there is less muscular action round T' than round T.

The advantages of the system 2 over 1 are however not simply mechanical, but the constancy of the angle  $\alpha'$  affords greater space for the respiratory movements, and thus physiologically there is an explanation for the difference in disturbance of circulation and respiration generally experienced when comparing the two systems.

R. J. LEE

St. George's Hospital

History of the Numerals

ON reading the letter on the "Origin of the Numerals" (vol. xii. p. 476) I was reminded of some portions of their history which I had before noted down, and which are essential to any consideration of their origin.

The earliest forms which I have seen are those of the Abacus (Journ. Archæol. Assoc., vol. ii.), from which our later forms are mainly, if not entirely, derived. The intermediate forms are to be seen in arithmetical treatises and calendars of the thirteenth to sixteenth century, and on sundry quadrants, &c., of the fourteenth to sixteenth century, in the British Museum.

In the following table the earliest form of each letter and of

Abacus	1250	1320	1420		

each variation is entered, with the corresponding date; the years 1280, 1320, 1420, and 1450 are only approximately stated.

Now, with respect to the primitive forms suggested by Mr. Donnisthorpe, the 2 would seem to have been two strokes at right angles (not parallel), the lower stroke of our form being only a tail, like that of many medial forms of Hebrew letters. The 3 may have been originally three vertical strokes, which were set horizontal in early times; the flat top, however, does not appear till 1574, and then only in English examples apparently. The 4 of the Abacus seems to have been deserted for cross lines connected, which are always placed diagonal till about 1474, when the first turn to the present position occurs: perhaps four strokes were intended, as we call cross-roads "four roads meet." 5 seems to have been inverted from the Abacus, and then about 1550 the straight tail was curved towards the previous figure, and the head elongated to lead to the next mark. It often occurs as a perfect though very straightened S in the sixteenth century, as it is now made in Belgium and other countries. Its form in 1280 reminds one of the Roman V written as U. 6 in the Abacus consists of six strokes; but this, from their cumbrous collocation, is probably merely a scribe's fancy. 7 has been apparently inverted (like 5) from the Abacus; its transitions are easily traced, but its origin is not so clear; some might see a trace in the Greek Z = 7. 8 has always been very near its present form, and the two squares is an explanation the character of which can only be objected to on the grounds of its inapplicability elsewhere. 9 has always had a straight tail, though it has been inverted since the Abacus form (as 5 and 7 seem changed): its origin might be looked for in the Greek  $\theta$  possibly, as that letter has varied more in form than any other; or, more likely, in the Arabic Ta, or Tha (= 9), which in the Abacus it closely resembles; and it is even more similar to the Syriac Teth, a twin form to that of the Arabic. Perhaps the ancient Arabic alphabet (in its nearer approximation to its Hebrew- and Samaritan-like original) would show the origin of more of these forms, and even the simple 1 is exactly the Arabic *Elif* = 1, for their alphabetic origin is rendered highly probable from the fact that the numerical systems of the Greeks and of the Semitic nations (from whom our Arabic numerals probably came) were in very early times derived from the alphabet; not, like the Egyptian and Roman systems, wholly separate arrangements.

The apparent, though historically untrue, applicability of the line + line origin of all the forms of our numerals, is an interesting example of the fallibility of any theory which only looks to present conditions, apart from past facts and history.

Bromley, Kent

W. M. FLINDERS PETRIE

Scarcity of Birds

I QUITE agree with Mr. Barrington, who writes in NATURE (vol. xii. p. 213) concerning the scarcity of birds. I find, by comparing my last year's ornithological diary with the present year's one, that I have only found about three-fourths of the number of Blackbirds' (*Turdus merula*), Thrushes' (*Turdus musicus*), Blue Titmouses' (*Parus caeruleus*), Pied Wagtails' (*Motacilla alba*), Greenfinches' (*Coccothraustes cororis*), Linnet's (*Linota canabina*) nests that I found last year. The Hirundinidae have been far less plentiful than usual; but the Goldfinch (*Carduelis elegans*) was the rarest bird here this summer. I did not succeed in finding a single nest, although our yearly average is fifteen. Other birds, as the Charadriidae and the Mussel Thrush (*Turdus viscivorus*), have been very plentiful, and I found the Mountain Linnet's (*Linota montium*) nest for the first time I have ever met with it on the lowland south of the Humber. Will not the hard frost of last winter account for the scarcity of our native birds in some measure?

Bottesford Manor, Brigg.

ADRIAN PEACOCK

OUR ASTRONOMICAL COLUMN

$\mu$  CASSIOPEÆ AND VICINITY.—Smyth (Cycle ii. p. 25) has the following remark with respect to stars near  $\mu$  Cassiopeæ:—"Just 18' south of  $\mu$  is a star which, though of the 6th magnitude, is not in Piazzi. It is followed nearly on the parallel, about 11° off, by a 9th magnitude, and both are remarkable from being red, of a decided but not deep tint." There is no star of the 6th magnitude near this position at the present time, nor so far as we know is there any record of such an object having been visible since the epoch of Smyth's observations, 1832-71.