

or less efficiently. Since these observations were made, it has been shown<sup>7</sup> that the gills of the Ephemeroidea *Hexagenia recurvata* are not essential to life in the winter months and that<sup>8</sup> even the elaborate gills of the Caddis *Macronema zebratum* are superfluous: the insect being capable of completing its life history without them.

In certain genera of Plecoptera tracheal gills are poorly developed and in some instances, by no means small forms, they are lacking altogether, so that gaseous exchange takes place entirely through the general body surface. Experiments with larvæ of a species of *Leuctra* which lacks tracheal gills entirely showed that respiration proceeds most rapidly at the ventral surface of the thorax and the bases of the legs, the indicators being affected later at the 'neck' and at the anterior region of the abdomen. In view of this, it is interesting to note that an American species of *Nemoura* has been described<sup>9</sup> as having the walls of the femora richly supplied with tracheæ as if to serve as a gill.

Tracheal gills are rare among dipterous larvæ. Such gills with a large tracheal supply occur in Tipulids (for example, *Pedicia*) and in the curious larvæ of the Pantophthalmidæ, but in each case open spiracles are present, and although the gills have been shown<sup>10</sup> to be the site of very rapid gas exchange compared to the rest of the body, it is known<sup>11</sup> that the larva (*Pedicia*) cannot long survive occlusion of the spiracles. They are at best a rather unimportant accessory means of respiration.

To sum up, it can be said that the blood gills found in aquatic insect larvæ are practically negligible so far as respiration is concerned, and to this extent the conclusions of Wigglesworth are supported. Certain types of tracheal gills, on the other hand, may be very efficient. But they are by no means the sole organs of respiration and even where highly developed, may be secondary in importance to the general body surface; under experimental conditions the animal can often do without them for long periods if not altogether.

W. H. THORPE.

Zoological Laboratory,  
Cambridge.  
Feb. 20.

\* Owing to their small tracheal supply and relatively large blood space the anal gills of mosquito larvæ are here classed as 'blood gills' rather than 'tracheal gills'.

<sup>1</sup> Fox, H. M., *J. Gen. Physiol.*, 3, 565; 1920.

<sup>2</sup> Harnisch, O., *Z. Verh. Physiol.*, 11, 285; 1930.

<sup>3</sup> Wigglesworth, V. B., *J. Exp. Biol.*, 10, 1, 16, 27; 1933.

<sup>4</sup> Thorpe, W. H., Proc. IV Int. Congress Entom. Paris (in press); 1933.

<sup>5</sup> Thorpe, W. H., *Proc. Roy. Soc.*, B, 109, 450; 1932.

<sup>6</sup> Cuenot, 'L'Adaptation', Paris; 1925.

<sup>7</sup> Morgan and Grierson, *Physiol. Zool.*, 5, 230; 1932.

<sup>8</sup> Morgan and O'Neill, *Physiol. Zool.*, 4, 361; 1931.

<sup>9</sup> Wu, C. F., Bull. Lloyd Library, 1923.

<sup>10</sup> Thorpe, W. H., in press (1933).

<sup>11</sup> Oldham, J. N., *Proc. Roy. Phys. Soc.*, 21, 33; 1926.

### Earthquakes in the Holy Land: A Correction

In an article on earthquakes in the Holy Land<sup>1</sup> there is given a list of 207 shocks, of which there is record, between the years 1606 B.C. and A.D. 1927. Among these are 27 dates from an Arabian authority, As-Soyuti, whose work appears in translation in the *Journal of the Asiatic Society of Bengal*. In transcribing these dates I failed to observe that they were stated as A.H., that is, *Anno Hejira*, instead of *Anno Domini*. They are, therefore, as quoted in my list something over six centuries too early. The corrected dates are as follows:

A.H.	A.D.	A.H.	A.D.	A.H.	A.D.
94	712	434	1042	552	1157
98	716	455	1063	565	1169
130	747	460	1067	575	1179
220	835	462	1069	578	1182
233	847	479	1086	597	1200
242	856	484	1091	600	1203
245	859	532	1137	702	1302
393	1002	538	1143	791	1388
425	1033	551	1156	889	1484

Inasmuch as the Hejira dates from July 622 A.D. and there are adjustments of the calendar dates for fractions, these figures may be off one year. It is also probable that the original dates are approximate. Hence where As-Soyuti differs by a year from others given in the list as published, one shock only is presumably meant.

In this connexion I would direct attention to a very ancient, yet definite observation regarding the now well-known earthquake fault that traverses the eastern slope of the Mount of Olives:

"And His feet shall stand . . . upon the mount of Olives, which in that day is before Jerusalem on the east, and the mount of Olives shall cleave in the midst thereof toward the east and toward the west, and there shall be a very great valley; and half of the mountain shall remove toward the north, and half of it toward the south."<sup>2</sup>

Activity on this fault was the occasion of destructive tremors in 1927. That it was the scene of more obvious displacement some 2,500 years earlier we cannot doubt in view of the graphic description of the Old Testament writer, although his identity and the exact date of his prophecy are matters of uncertainty, especially with reference to this particular passage.

BAILEY WILLIS.

Stanford University,  
California.  
March 6.

<sup>1</sup> *Bull. Seismol. Soc. America*, 18, 1928.

<sup>2</sup> Old Testament, *Zechariah*, 14, 4, 520 B.C.

### A Numerical Coincidence

In "The Expanding Universe" Sir Arthur Eddington refers to the *fine-structure constant*, which appears to be a fundamental in the modern physics of which he treats, as a pure number the value of which is close to, if not exactly, 137, and in a later passage he writes: "nature's curious choice of certain numbers such as 137 in her scheme."

There is no indication that Sir Arthur includes the following facts in his thesis but it is undoubtedly the case that the number 137 is remarkable because it is the logarithm of itself, or, to be more precise, 13713 is the mantissa to five decimal places of the logarithm of 13713. Also the reciprocal of 13713 used as circular measure is the value of the usual symbol for the rate of rotation of the earth, it being the angle through which the earth turns in one second of mean solar time.

These things are mentioned as an interesting coincidence in an excellent but perhaps little known book, "A Few Chapters in Astronomy", by Claudius Kennedy, first published in 1894. The resemblance of this salient number to one in a very different connexion may well be taken as an example of Nature's whimsicality.

H. P. HOLLIS.

65, Tranquil Vale,  
Blackheath, S.E.3.  
March 13.