

correspondence

Roots of 'enzyme'

SIR,—There can be no doubt that Kühne introduced the word *Enzym*, from which, of course, was formed its English equivalent. The reasons for his choice are discussed in at least two printed sources^{1,2}. But the actual construction of the word from Greek originals is less certain, in spite of some very definite statements in the literature.

Bayliss gave a translation of the relevant passage of reference 2, in two slightly different versions in *The Nature of Enzyme Action*, page 11–12 (Longmans, London 1925) and *Principles of General Physiology* (Longmans, London). The words concerned in the former are as follows “... but it merely states that *εν ζυμη* [in yeast] something occurs that exerts this or that activity, which is considered to belong to the class called fermentative”. Nothing could be clearer: rarely do we have as precise knowledge as this of the thought processes of an author. However, Greek words do not occur in the original at all. They are an interpolation by the translator, whose immense authority and influence has led to almost universal acceptance of this version. The original runs at this point, “... sondern nur gesagt, dass in der Zyme etwas vorkomme, das diese oder jene zu den fermentativen gerechnete Wirkung habe ...”.

Bayliss's translation of this passage is, in other respects also, remarkably inaccurate. But unless there is concrete evidence of Kühne's intentions we are reduced to considering probabilities, and this direct construction from *εν ζυμη* still seems rather more likely than the alternative etymology put forward in *The Oxford English Dictionary*. According to this authority, the word was formed on modern Greek *ενξυμος*, meaning 'leavened', or more specifically the leavened bread used in the Eucharist of the Greek Orthodox Church. The very word 'enzyme' was used in English in 1850 in this sense. It seems unlikely that Kühne would have had any knowledge of modern Greek and, if not, this derivation appears to be impossible, even though it preserves a connection with the primitive meaning of the word 'ferment' which Kühne was seeking to replace.

As pointed out by Plantefol, in

Comptes Rendus de l'Académie des Sciences 226C, 1976, a compound had already been formed in Greek meaning 'yeast in' rather than 'in yeast', so that Kühne's probable sequence of thought was somewhat unfortunate. But even Plantefol seems unaware of Bayliss's blunder. Plantefol also quite justly comments that 'enzyme' has merely taken over the functions of the pre-existing word 'diastase'. (In neither case is the etymology of any relevance to modern ideas of the nature and function of the substances concerned). It seems regrettable, if irretrievable, that this usurpation should have occurred.

Yours faithfully,

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- 1a *Verhandlungen des Naturhistorisch—Medizinisch Vereins zu Heidelberg* 1 Pp 190–3 (1877). Formally anonymous report of a conference speech by Kühne. Recently reprinted with reference 1b in facsimile in *FEBS Letters*, supplement to 62 (1976).
1b Kühne, W. *Verhandlungen des Naturhistorisch—Medizinisch Vereins zu Heidelberg* 1 Pp 194–8 (1877).
2 Kühne, W. *Untersuchungen der physiologisches Institut der Universität Heidelberg* 1 Pp 291–324 (1878).

Proton–electron mass ratio

SIR,—Sirag (28 July, page 294) states that the proton–electron mass ratio is 1836.109, and derives a combinatorial prediction of 1836 for this quantity. The most recent editions of the *Review of Particle Properties* give $1836.1514 = 0.0073$, some 21 standard deviations away. While the accepted value for the proton mass has changed significantly since about 1973, the value 1836 for the ratio m_p/m_e has been getting less and less plausible for at least the past 15 years.

The value $6\pi^3 = 1836.1181$ has been calculated, on very different grounds, to be this mass ratio (see *Physics Today*, page 17–19, August, 1971, for discussion). It is substantially closer to the most recent experimental value, but is still in disagreement by 4.6 standard deviations. It is also perhaps worth drawing attention to the apparent tendency of stable hadrons (and the muon) to have masses which are integral multiples of $3m_e$, the threefold electron mass. This has been discussed by R. Frosch in *Lett. Nuovo Cim.* 8, 633 (1973), and at a meeting of the

Swiss Physical Society, Geneva, 8–9 October, 1976.

Yours faithfully,

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Was Darwin the Bellman

SIR,—The uncanny resemblance of F. Waddy's engraving of Darwin on the cover of 21 July to Henry Holliday's picture of the Bellman in the 1876 edition of *The Hunting of the Snark* by Lewis Carroll (Macmillan) (see below) and the 1962 edition of *The Annotated Snark* by Martin Gardner (Penguin Books), must have caused many to suspect that Darwin was the Bellman. This suspicion is confirmed by the two tufts (of hair?) at the foot of Waddy's picture, strongly suggesting that Darwin, in

“Supporting each man on the top of the tide

By a finger entwined in his hair”
had inadvertently scalped two of the crew.

Was it really the Snark that the Bellman was after in his voyages in H.M.S. Beagle (see pp28–31 and p52 footnote 17 in *The Annotated Snark*)?

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