

within the last few thousand years. Even if, as Fisher *et al.*<sup>6</sup> suggest, a compensatory mechanism is at work, such a mixing is not unlikely.

So far as is known, all the peoples of Asia and North Africa have very high *Rh*-positive frequencies, but until recently no source for the hypothetical *Rh*-negative element could be found. Etcheverry<sup>7</sup> has now published the results of *Rh* tests on 128 persons of Basque descent living in the Argentine, of whom 33.6 per cent are *Rh*-negative. If tests on larger numbers of subjects bear out this remarkable observation it will be highly probable that the *d* gene in Europe is mainly derived from ancestors akin to the modern Basques. An examination of the full *Rh* genotypes and other blood group antigens of as many Basques as possible is much to be desired, and steps are being taken to secure the necessary specimens. There are likely, however, to be many hindrances and delays, and I do not wish to discourage any other investigator from working on the same lines.

*Note added in proof:* Since the above was written, Dr. M. A. Etcheverry has kindly sent me an extract from his book, "Transfusion sanguinea", p. 113 (Buenos Aires, in the press) and a copy of his paper "El factor Rh en personas de ascendencia ibérica et itálica, residentes en Argentina", *Semana médica* (in the press). In these works he gives further statistics increasing the total number of Basques examined to 250 with 35.6 per cent of *Rh*-negatives. He also puts forward the suggestion that the Basques are the present-day representatives of the racial group from which the *Rh*-negative or *d* factor in the population of Europe is derived.

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<sup>1</sup> Boyd, W. C., and Boyd, L. G., *Amer. J. Phys. Anthropol.*, **23**, 49 (1937).

<sup>2</sup> Vallois, H. V., *Bull. Soc. Anthropol.*, **5**, 9th Ser., 53 (1944).

<sup>3</sup> Fisher, R. A., personal communication cited by Race, R. R., *Nature*, **153**, 771 (1944).

<sup>4</sup> Haldane, J. B. S., *Ann. Eugen.*, **11**, 333 (1942).

<sup>5</sup> Wiener, A. S., *Science*, **96**, 407 (1942).

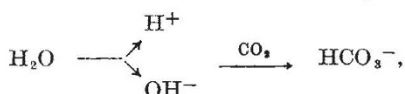
<sup>6</sup> Fisher, R. A., Race, R. R., and Taylor, G. L., *Nature*, **153**, 106 (1944).

<sup>7</sup> Etcheverry, M. A., *Dia méd.*, **17**, 1237 (1945).

### Source of the Hydrogen Ions Produced by Gastric Mucosa

Conway and Brady<sup>1</sup> have claimed to show two statements made by Davies, Longmuir and Crane<sup>2</sup> ". . . to be incorrect, as indicated in the accompanying cyclical scheme". These statements were (1) ". . . so Conway's statement that . . . a cyclical process<sup>3</sup> could give a  $Q_{HCl}$  far higher than  $Q_{O_2}$  is not justified"; and (2) "These facts rule out theories dependent upon the production of hydrogen ions by the fermentation or oxidative degradation of any carbon compound".

A critical analysis of their new cyclical scheme<sup>1</sup> shows that the overall reaction is really



which is exactly that put forward by ourselves<sup>2,4</sup>. It is unfortunate that Conway and Brady in their present scheme<sup>1</sup> have not made it clear that  $\text{H}_2\text{O}$  is utilized between stages 2 and 3 and not between stages 5 and 6, that the hydrogen ions which are

secreted come initially from the hydrogen atoms in water, and that the rate at which they are formed is not limited by the rate of production of organic acids from glucose or other precursor during their oxidative degradation, as previously postulated by Conway, Fitzgerald and Walls<sup>5</sup> and disproved by our experimental evidence<sup>2</sup>.

The first mention of the cyclical scheme<sup>3</sup> seemed to put it on the same plane as the statement<sup>2</sup> that ". . . the hydrogen ions from an organic acid may supplement those from carbonic acid", which has already been refuted<sup>2</sup>. We are interested to see that in the fuller explanation of this scheme<sup>1</sup> part of our own mechanism has been incorporated though, since they have not presented any relevant experimental evidence, it seems premature for Conway and Brady to speculate on precisely how water is split by gastric mucosa to form hydrogen and hydroxyl ions.

Their calculations<sup>1</sup> concerning the energy required per equivalent of hydrogen ion are irrelevant, since in this cyclical scheme, starting and finishing isothermally with a compound such as phosphoglycer-aldehyde, the free-energy change for its oxidation and subsequent reduction must be zero. In any event, the calculations are based on a relation between oxidant and reductant arrived at by speculation. The energy required is that needed for the fundamental reactions of the water to proceed, and this and considerations of the efficiency relations of gastric mucosa will be discussed elsewhere.

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<sup>1</sup> Conway, E. J., and Brady, T., *Nature*, **159**, 876 (1947).

<sup>2</sup> Davies, R. E., Longmuir, N. M., and Crane, E. E., *Nature*, **159**, 468 (1947).

<sup>3</sup> Conway, E. J., and Brady, T., *Nature*, **159**, 137 (1947).

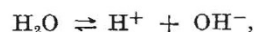
<sup>4</sup> Crane, E. E., Davies, R. E., and Longmuir, N. M., *Biochem. J.*, **40**, Proc. xxxvi (1946).

<sup>5</sup> Conway, E. J., Fitzgerald, O., and Walls, D., *Nature*, **156**, 477 (1945).

IN reply to Davies *et al.*, we may say that it has been definitely shown that their two statements quoted by us were erroneous. In the cycle, which explains the high  $Q_{HCl}$ , the hydrogen ions appearing in the gastric secretion do not originate in the splitting of water, but from the ionization of phosphoglyceric acid, produced by the fermentation of phosphoglyceraldehyde.

They proceed to summarize our cycle in an overall reaction which is misleading, and, in fact, inaccurate.

In the short space of a letter, we found it convenient to represent bicarbonate formation (conventionally described as an alkalinity) as arising from the neutralization of hydroxyl ions by carbonic acid. Since much emphasis is given to this by Davies *et al.*, a fuller treatment would show that neutralization of hydroxyl ions formed by the ionization of water molecules would not occur beyond a slight initial stage. In a steady state with a steady  $pH$  value in the cellular region, the reaction



with  $\text{H}_2\text{O}$  and  $\text{H}^+$  ion concentrations fixed, involves no excess production of hydroxyl ions. But the reactions