The results described indicate that the acetylcholinesterase of erythrocytes is readily accessible to proteolytic enzymes. The failure of these enzymes to affect choline transport and the sodium pump even after prolonged incubation suggests that the outward facing parts of these transport mechanisms are either not accessible or resistant to the enzymes used. MARCHESI AND PALADE[3] found that the (Na^+-K^+)-activated ATPase in the ghosts of guinea-pig erythrocytes is rapidly inactivated by trypsin but that this inactivation can be largely prevented by preincubating the ghosts with ATP and Mg^{2+}. The experiments reported here were done with intact cells containing ATP; the sodium pump may therefore have been protected and it is possible that, had ATP not been present, the pump might have been affected by chymotrypsin. The view that a protein is part of the choline transport system is supported by the observation that the transport of choline can be inhibited by *p*-chloromercuriphenylsulfonic acid, presumably because this compound blocks sulfhydryl groups. Since pronase, a rather nonspecific enzyme, does not interfere with choline transport it appears that the outward facing part of this transport system is resistant or not readily accessible to the proteolytic enzymes. There is some similarity between the results described here and the observation made by ALBUQUERQUE *et al.*[4] that at the neuromuscular junction proteolytic enzymes will inactivate cholinesterase without reducing the acetylcholine sensitivity. These authors conclude that the receptor protein is either resistant to denaturation or that its hydrolysis does not interfere with its receptor function.

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Active Na^+ transport in isolated frog gastric mucosa during hypoxia

The potential difference between the mucosal and serosal sides of the gastric mucosa, with the mucosa negative, has been extensively studied, but the nature of this potential difference is still a matter for debate. HOGBEN[1–3] demonstrated that in the isolated frog mucosa the short-circuit current could account for the net Cl^- transport *minus* the H^+ transport. He therefore concluded that the electrogenic process for the mucosal potential was an active Cl^- transport from the serosal to the mucosal side. He did not, however, find any evidence for active transport of Na^+. In mammals, however, the situation has been reported to be different. CUMMINS AND VAUGHAN[4–6] found in isolated rat stomach walls a definite active Na^+ transport from the mucosal to the serosal side. They concluded that there was a species difference between rat

and frog. Similar results were obtained in isolated foetal rabbit stomachs[7] as well as in isolated cat mucosa[8] and in isolated stomachs from the cat, dog, rhesus monkey and man[9].

DAVENPORT AND JENSEN CHAVRÉ[10] found in isolated mouse stomachs that they had to raise the partial pressure of O_2 to about 3200 mm Hg to minimize lactic acid production. They concluded that such a high O_2 tension was necessary in these stomachs for complete oxygenation of the cells. In the light of their experiments it may be suspected that mucosae isolated from mammals have been in a hypoxic state in former experiments and therefore not quite suitable objects for study. Accordingly we have studied isolated frog (*Rana temporaria*) mucosa under different conditions of oxygenation. The mucosa was mounted as a membrane between two lucite chambers. The membrane potential was measured between two calomel electrodes and a current was passed through the mucosa between two Ag–AgCl electrodes to obtain an electrically short-circuited membrane. The system was maintained at 20°. The solution at the serosal side was a buffered frog Ringer solution (pH 7.12) and that on the mucosal side was unbuffered to allow continuous titration of the H^+ secreted. Both compartments were gassed with 5 % CO_2 *plus* different concentrations of O_2 from 95 % down to 5 %, and also N_2. The mucosal side was kept at a constant pH of 4.7 by an automatic titration device.

At full oxygenation (95 %) there was a negligible active transport of Na^+ as measured simultaneously by $^{22}Na^+$ and $^{24}Na^+$ fluxes in opposite directions. When the O_2 concentration was reduced to 40 %, there was a significant rise in the active transport of Na^+ from the mucosal to the serosal side with the short-circuit current almost unchanged. The Na^+ transport accounted for 20 % of the short-circuit current which probably was in part still generated by an active transport of Cl^- which apparently decreased during hypoxia. When the O_2 was lowered to 5 %, both the Na^+ transport and the short-circuit current decreased. The H^+ secretion was diminished at both 40 % and 5 % O_2 concentrations.

Thus it has been demonstrated in the isolated frog gastric mucosa, which under full oxygenation has an active transport of Cl^- and only a negligible transport of Na^+, that hypoxia induces an active transport of Na^+ which in part is responsible for the generation of the short-circuit current. These findings may be of importance in evaluating the experiments on isolated mammalian stomachs which have a large production of lactic acid and thus may be in a somewhat hypoxic state.

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