rate. The average PD before carbachol was -1.4 mv (minus means nutrient negative). Addition of carbachol to the nutrient resulted after a latent period of 3 to 7 min., in the PD becoming more negative. the PD peaked (average PD = -5.2 mv at peak) and then gradually became more positive and leveled off around -2.4 mv. Carbachol resulted in a decrease of the resistance from an average value of 232 ohm cm^2 to an average of 150 ohm cm^2. Addition of thiocyanate to nutrient (20 mM) caused a marked reduction of the H^+ rate, an average increase of the positivity of the PD by 7.5 mv and an increase in the resistance. Preliminary experiments reveal that thiocyanate when added to the secretory side inhibited H^+ secretion and resulted in a much smaller increase in the positivity of the PD. After the H^+ rate was reduced to about zero further increases in thiocyanate on the secretory side resulted in an increase in the negativity of the PD. In a typical experiment with a thiocyanate nutrient and a Cl^- secretory solution the PD was +16 mv and with a thiocyanate secretory and a Cl^- nutrient the PD was -16 mv. These effects of thiocyanate on PD could be interpreted to mean that the gastric mucosa is more permeable to thiocyanate than to Cl^- in the net transport of charge sense.

1963 #29

THE STRUCTURE OF GILLS

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In order to obtain a thorough knowledge and understanding of gill structures, the following fishes were fixed and prepared for electron microscopy: A) Agnatha: hagfish. B) Condrichtyes: dogfish. C) Osteichthyes: 1) marine: pollock, fundulus, longhorn sculpin; 2) brackish: fundulus; 3) fresh water: catfish, eel, goldfish, fundulus. The gills of these fishes are being studied by means of both phase contrast and electron microscopy. In particular, the following structures are analyzed: a) surface epithelium, secretory and excretory cells; b) sinusoids of the gill lamellae; c) connective tissue components such as fibroblasts, cartilage, basement membranes; d) vascularization of the gill filament: afferent-efferent blood vessels, lymphatics, and lymphoid tissue.

1963 #30

CARDIAC OUTPUT DURING DIVING IN THE HARBOR SEAL, Phoca vitulina

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The adaptive mechanisms that permit prolonged diving in mammals have been of great interest. It is well known that these adaptations involve circulatory readjustments so that blood flow to critical areas such as brain are maintained. The occurrence of bradycardia in response to diving has been well documented in the seal. Indirect evidence has suggested a generalized arterial constriction in all areas except the brain during diving. Because of technical problems, successful measurements of cardiac output during diving have not been reported nor has there been reported direct evidence of generalized arterial constriction. In the present study the Ham-