methacholine. Dose-dependent augmentation of acid secretion response was obtained by histamine within the dose range of 50 to 200 μg/kg, and by methacholine 1,000 to 1,600 μg/kg. The maximal responses were obtained 30 min after the injection of each stimulant. The stimulatory effect of histamine was exerted without a latent period, and then it returned to the basal level of acid output within 45 min, although that of tetragastrin or methacholine remained within 60 min after the medication.

3. Inhibitory effect of atropine and burimamide. The interactions between these secretagogues and some inhibitors were inspected in the fowl preparations. Atropine and burimamide were used in this experiment. The latter is reported to have a specific histamine H_2-receptor antagonistic effect[5]. As shown in Figure 3, atropine completely abolished the stimulatory effect of methacholine. It was confirmed that this inhibitor also depressed the action of tetragastrin significantly but showed no influence on the action of histamine. Burimamide was shown to suppress the effects of all 3 secretagogues.

Discussion. Many investigators[6–8] have used rat stomach preparations with acute fistula for the study of gastric acid secretion. The rat seems, however, less sensitive to histamine than other animals. Therefore, it seems inadequate to employ only the rat as the experimental model in the study of histaminergic mechanisms of acid secretion. Since our preliminary experiments on the effect of histamine on gastric acid secretion have revealed that anesthetized young chicken preparations were more sensitive to histamine than were rats, it was decided to develop a standard technique which permits quantitative determinations of the gastric secretory responses to several drugs.

We first checked the durability of the basal acid secretory responses. The mean of basal acid secretory rates of 210 chickens was 96.7 ± 2.0 μeq.H^+/60 min/50 g of b.w. for the first 1 h. This value remained almost constant for the next 2 h. This acid output seemed to be considerably higher than that of other authors[3,4,9], who examined unanesthetized adult chickens.

In the next experiment, dose-response relationships for histamine, tetragastrin and methacholine were examined for the quantitative estimation of secretagogue actions. In the anesthetized young chickens, it was shown that histamine, tetragastrin and methacholine produced maximal stimulation at the dose of 200, 100 and 1,000 μg/kg, respectively. It was shown that tetragastrin was 2–4 times as potent as histamine and 10–16 times as potent as methacholine. RUOFF and SEWING[4] have already reported that histamine, pentagastrin and carbachol stimulated acid output maximally at the dose of 400, 200 and 160 μg/kg, respectively, in the unanesthetized chickens. Conspicuous differences in the sensitivity to cholinergic agents were observed between their preparations and ours. It was obvious that the dose of tetragastrin and histamine required to elicite the stimulation of acid secretion was lower in the young chickens than in the rats. In regard to the sensitivity to histamine, the young chicken seems to be 10–40 times as susceptible as the rat. In addition, the effects of 2 types of antagonists, atropine and burimamide, were tested on the secretagogue-stimulated acid secretion. The anticholinergic drug showed complete antagonism to methacholine and significant depression of tetragastrin. However, the facilitating action of histamine was not affected by atropine. On the other hand, burimamide showed an inhibitory effect on all types of secretagogues.

The anesthetized young chicken preparations appear preferable for the investigation of acid secretion in the following respects: 1. the secretory rate was fairly high under anesthesia and constant for 2–3 h; 2. the acid secretion was dose-dependently augmented with 3 representative secretagogues; 3. the pattern of secretory responses is essentially similar to those known to occur in the mammals; 4. the antagonistic interactions between secretagogues and inhibitors were clearly demonstrated; 5. large numbers of chickens from a homogeneous colony are easily obtained; 6. a large number of birds can be studied simultaneously; and 7. only a small amount of test drugs are required for screening experiments. For these reasons, we concluded that the acute gastric fistula preparation of fowls provides a convenient experimetal method for the study of acid secretion.

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