gree of involvement. In 450- and 500-day-old males, much of the degenerated lacrimal acinar tissue had been replaced by sebaceous type acini similar in morphology to the Harderian gland. The presence of intranuclear inclusions and subsequent bizarre cellular activity was not observed in any females regardless of age.

Many atypical inclusion bodies (Fig. 3) were observed in 200-day Sprague-Dawley males. The spherical eosinophilic mass shown in Fig. 4 appears to be a giant pleomorphic inclusion body measuring 23 μ diameter.

Although the significance of the disease and method of treatment are not known, it would seem essential that frequency of occurrence in other laboratory strains from different geographic locations be determined.

Summary. Cytomegalic inclusion disease of intraorbital and exorbital lacrimal glands was observed in adult male rats from 8 laboratory colonies but was not seen in any females nor in wild urban or rural Norway rats. Affected acinar cells showed characteristic eosinophilic intranuclear inclusion bodies and subsequent cytomegaly. Bizarre nuclear patterns simulated neoplastic morphology in late stages of the disease.

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Lack of Correlation Between Adrenal Weight and Injury in Grouped Male Albino Mice.* (24869)

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Grouping previously segregated mice results in adrenal hypertrophy which is least in dominant animals and greatest in most subordinate animals(1). Adrenal hypertrophy also occurs in freely growing populations of house mice, although fighting may be rare in these populations(2). Apparently neither fighting nor injury accounts for the adrenal hypertrophy(3). Although this belief has not been tested critically, it resulted from 2 types of observation: (a) adrenal hypertrophy apparently occurs in populations without fighting as well as in those with fighting, and (b) dominant animals usually fight more than subordinate animals. However, evidence has not been presented eliminating the possibility that injury from fighting could account for adrenocortical hypertrophy. This paper presents data showing lack of relationship between injury from fighting and adrenal weight in grouped male mice.

* Opinions expressed in this article are those of the author and not necessarily those of the Navy.

Methods. These data on adrenal weight and scarring were collected from experiments exploring relationship between adrenal weight and population density. All data are from grouped mice whose adrenals averaged 8 to 10% heavier than those of their segregated controls. These comparisons between adrenal weights of grouped and segregated mice are discussed in detail elsewhere(3,4,5,6,unpubl.). The data for each group of means or for each Table represent a collection of homogeneous data with respect to treatment, experiment, and time. Albino male mice from Naval Medical Research Inst. colony were used. Procedure was similar for each experiment and no groups were subjected to experimental procedures other than grouping. Male mice were segregated at weaning and for 3 weeks thereafter then were grouped by different sizes for 1 week, then autopsied, and severity of scarring recorded for each mouse. In some experiments scarring was recorded as absent, few scars, or severely scarred, while in other

experiments the actual number of scars was either counted or designated as 20 or more scars.

Results. When 40 populations were divided into those with no scarred mice and those with 1 or more mice scarred from fighting, the amount and severity of scarring presumably from fighting did not affect adrenal weight (Table I). Absence of scarring is indicative of either very little or no fighting.

Mice from 26 populations of 4, 5, or 6 "fighting" males each were categorized scarring absent, slight, or severe (more than 6 scars) and mean adrenal weight determined for each category of scarring for each population. Thus mean adrenal weight and standard error for each scarring category was calculated. Mean adrenal weights were respectively 5.86 ± .16, 5.56 ± .18, 5.58 ± .18 for unscarred, slightly scarred, and severely scarred categories. Twenty-three of the 26 populations had one or more unscarred mice. When there was only 1 unscarred mouse in a population (17 of the 23 populations) it was the dominant mouse in that population. There was an apparent tendency for adrenal weight to decrease with increased scarring, although the differences in mean adrenal weight were not significant ($P>0.30$).

Table II summarizes data from experiment with 10 populations of 6 mice each. Number of scars on each mouse was counted after one week of grouping. There was a significant decline in absolute adrenal weight and body weight as scars/mouse increased. However, adrenal weight relative to body weight did not decline, and in fact remained constant or even increased as scars increased, although the differences in mean relative adrenal weights between categories of scarring were not significant.

TABLE I. Difference in Mean Adrenal Weights of Albino Mice from Groups in Which There Was Fighting with Injury (Cuts about the Rump, Tail, Hind Legs) and from Groups from Same Experiments in Which There Was No Fighting or Fighting without Injury. Group mean values used. The 2 experiments were run at different times and are not comparable.

Exp.	Fighting in groups	Group size	No. of groups	Mean adrenal wt ± stand. error
I	No injury	6	16	5.29 ± .12
	Injury	6	14	5.29 ± .10
II	No injury	4	3	6.00 ± .31
	Injury	4	7	5.80 ± .23

TABLE II. Adrenal Weights *vs* Number of Scars for 60 Mice from 10 Groups of 6 Each. A barely significant difference ($P<.05$) exists in absolute adrenal weights between those with no scars and those with more than 20. There is also a significant decline in weight with increased scarring. Adrenal weights relative to body weights do not vary significantly with respect to scarring. Relative adrenal weight tends to increase with increased scarring.

		Means ± stand. error		
Scars	Mice	Absolute adrenal wt	Body wt	Adrenal wt, mg/100 g body wt
0	17	5.33 ± .17*	25.2 ± .62	21.3 ± .65
1– 4	16	5.40 ± .18	24.4 ± .85	22.6 ± 1.10
5– 8	9	5.21 ± .23	23.8 ± .70	22.0 ± 1.22
11–17	7	4.90 ± .26*	22.4 ± .85	22.1 ± 1.65
>20	11	4.78 ± .20*	21.1 ± .58	22.9 ± 1.35

* $P<.05$.

Discussion. Although there is usually a relationship between degree of scarring and social rank in individual mice of a group, the relationship between adrenal weight and social rank(1), as indicated by amount of scarring, is not clearly apparent. However, there is a suggestion that adrenal weight relative to body weight increases with increasing scarring within groups. This tendency for relative adrenal weight to reflect increased scarring must come from differences in social rank rather than degree of injury, as there was no difference in mean adrenal weights of groups with and without scarred mice (Table I). These results warrant the conclusion that scarring (or injury) from fighting is not an important factor in producing adrenal hypertrophy observed in grouped mice. These results are a further indication that sociopsychological interactions between mice, and not physical factors, are responsible for adrenal hypertrophy following grouping.

The reason for lack of correlation between adrenal hypertrophy and injury seems to be that injuries from fighting are quite superficial. The wounds usually penetrate only the skin, heal rapidly, and therefore do not represent serious injury. Nevertheless, an occasional mouse is attacked so severely by its cage mates that wounding may be extensive. Healing is usually slow in these cases and involves considerable scarring. However, gross

damage of deeper tissues has not been observed in these mice. It might be expected that these mice would show a more marked adrenal hypertrophy, but this cannot be evaluated with present data.

Summary. Amount of scarring and adrenal weight were compared for 280 male albino mice from 50 populations of 4, 5, or 6 mice each. No relationship was found between adrenal weight and absence or presence of scarring or between adrenal weight and amount of scarring. There was a significant decline in absolute adrenal weight with increased scarring, but this decline disappeared when adrenal weights were corrected for body weight. It was concluded that adrenal hypertrophy after one week of grouping did not reflect amount of injury received.

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Effects of Adrenalectomy and Aldosterone on Sodium Concentration in Renal Medulla of Hydropenic Rats.* (24870)

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Relying upon the hairpin countercurrent theory proposed by Hargitay and Kuhn(1). Wirz suggested that concentrating ability of mammalian kidney depends on water-free active solute reabsorption taking place in the ascending limb of the loop of Henle(2). This theory has been supported by the demonstration in hydropenic animals of increasing osmotic pressure in the medulla, from its cortical margin to the extremity of the papilla (3,4) and by recent work of Gottschalk and Mylle showing high osmolality of tubular fluid obtained from the tip of the loop of Henle(5). Removal of solutes from the fluid flowing up the ascending limb of the Henle loop is suggested by the hypotonicity of urine obtained from the first portion of the distal tubule(2,6,7). Quantitatively, the major ion involved in active transport process upon which the concentrating mechanism depends, is likely to be sodium(6). In man, aldosterone causes, within 2 to 4 hours, a reabsorption of sodium by kidney greater than could be accounted for by exchange for potassium and hydrogen ions (Crabbé, J., unpublished observations), thought to occur in the distal convoluted tubule(8). This suggested that aldosterone might stimulate sodium transport system in the loop of Henle. Assuming that sodium is the solute actively reabsorbed at that site and relying upon the observation that its proportional contribution to total solute content of the papilla is constant(4), it should therefore be possible to examine this hypothesis by measuring concentration of sodium in the papilla of concentrating kidney.

Methods. Twenty-four Holtzman female rats, 4 months old, were deprived of water 40 hours, and fasted 28 hours, before sacrifice. Two groups of 6 rats (groups B and D) had been adrenalectomized under ether anesthesia 80 hours before start of experiment, *i.e.,* 120 hours before sacrifice, and had been maintained on food and 1% sodium chloride solution *ad lib.* during the interval. Twelve intact rats were placed on same regimen (Groups A and C). The animals were transferred to metabolic cages 28 hours before sacrifice.

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