vaccinated with either the BCG culture or with the heat-killed cultures of bovine tubercle bacilli.

The spleens, which were all enlarged, measured on the average 30x23x3 mm. In most instances they were studded with macroscopic tubercles of varying size. Microscopically numerous tubercles consisting of extensive areas of caseation were found; many of them confluent. Numerous epithelioid cells were observed about the caseous areas, as well as in other parts of the spleen. Softening of the tubercles was observed in 2 instances, and tubercle bacilli were demonstrable in the spleen of 6 animals.

Summary. Guinea pigs vaccinated with the attenuated BCG strain of tubercle bacillus, and thereby made allergic, were reinfected intratracheally with a small number of virulent tubercle bacilli. Examination of the animals 6 weeks after reinfection showed a small number of fibrous or fibrocaseous tubercles in the organs and lymph nodes in most instances, but failed to show any evidence of softening, nor could tubercle bacilli be demonstrated in the sections. Guinea pigs vaccinated with heat-killed tubercle bacilli, although less allergic, as well as control, unvaccinated guinea pigs that were not allergic, when reinfected with virulent tubercle bacilli showed 6 weeks after reinfection extensive tuberculosis of the organs and lymph nodes with well marked softening; and in most instances numerous tubercle bacilli were demonstrable in the sections. Thus, no relationship could be established between the presence of allergy at the time of reinfection and the subsequent softening of the tuberculous process.

8260 P

Nitrogen Content of the Bile of Normal and Diseased Gall Bladders.*

H. G. ARONSOHN AND E. ANDREWS.

From the Department of Surgery, The University of Chicago.

A series of recent papers have indicated the possibility that simple bacterial infection is not sufficient to explain the onset of at least part of the clinical cases of cholecystitis. Not only has the diseased gall bladder in about half the cases defied the attempts of bacteriol-

* This work was done in part under a grant from the Douglas Smith Foundation for Medical Research of the University of Chicago.

ogists to grow organisms from it, but, as Feinblatt[1] and others have pointed out, the histological picture is not consistent with that to be expected in a purely infectious process. The evidence in this matter has recently been summed up by one of us.[2, 3] With these points in view the following series of studies of the possible or probable chemical constituents of the bile has been undertaken in order to elucidate the possibilities of a purely chemical cholecystitis.

While each of the normal constituents of bile has at some time or other been accused as the causative agent of cholecystitis in man, very little work has been done on its nitrogen content. The striking conclusions found by Gundermann[4] have received but little attention. He found that the total nitrogen content of the human gall bladder was much higher in cholecystitis while in stone-containing gall bladders, it was variable. Boekelman,[5] by aspirating human bile from the duodenum, arrived at similar conclusions.

TABLE I.

	No. of Cases	Total N, Mg. % Range	Aver.	Prot. N, Mg. % Range	Aver.	NPN, Mg. % Range	Aver.
I. Stone containing	5	315-577	496.2	93.8-170.5	118.2	162-442.5	326.5
II. Chronic changes on the gall-bladder wall (adhesions, hypertrophy, obliteration, etc.)	21	55-924	437.3	40-462	191.5	37.4-444	229.2
III. Normal and distended gall-bladders	15	43.1-798	452.1	43.1-375	158.2	12.3-600	207.1

41 human postmortem biles.

Table I shows the range and average figures of 41 postmortem biles and it is obvious that there is no significant relationship in the different groups. Lack of space prevents us from giving the individual figures but suffice it to say that their fluctuations are extreme and apparently pointless.

Table II gives the data on bile from 13 human gall bladder operations from which more accurate clinical and microscopic data could be secured. No definite conclusions can be drawn from these results. The figures in the different groups vary widely and no characteristic level for any group may be postulated.

1 Feinblatt, H. M., *New Eng. J. Med.*, 1928, **109**, 1073.

2 Andrews, E., and Dell, L., *Arch. Int. Med.* In press.

3 Andrews, E., *Trans. West. Surg. Assn.*, 1934.

4 Gundermann, *Mitt. a. d. Grenzgeb. d. Chir.*, 1926, **39**, 353.

5 Boekelman, *Klin. Wochen.*, 1928, **7**, 65.

TABLE II

	No.	Mg. % Tot. N	Mg. % Prot. N	Mg. % NPN
Gall bladder bile				
Stone-containing bile				
Acute change (round cell infilt., edema, etc.)	1		521.4	
	2		28.0	
	3	24	10.7	
	4	207	111.0	88.0
Chronic change (hypertrophic processes, fibrous thickening, etc.)	5		37.5	
	6	75	34.1	41.6
	7		pract. none	
	8	285	136.5	125.2
	9	251	115.0	125.0
About normal (very little cell reaction) distended gall bladder	10	222	30.0	
	11	157	55.0	
	12	414	222.0	157.0
Liver bile	13	44	12.0	28.0

13 human operation biles.

For the sake of comparison the average figure for dog biles taken from the gall bladder was found to be 340 mg. of total nitrogen, while in experiments where the common duct was ligated, it was found that in some cases this total nitrogen rose and in others it fell, there being no consistency in its fluctuation even if several weeks elapsed.

8261 P

Bile Salt Cholecystitis.*

H. G. ARONSOHN AND E. ANDREWS.

From the Department of Surgery, The University of Chicago.

Pancreatic juice, in the case of obstruction at the ampulla of Vater may become activated by some unknown factor and develop a marked proteolytic activity in the pancreatic tissues. In the same manner the digestive power of gastric juice may become so enhanced that a gastric ulcer will be produced. Whatever other factors are active, it is clear that pure gastric juice *per se* may have the power to erode the gastric mucosa. It has been suggested recently

* This work was done in part under a grant from the Douglas Smith Foundation for Medical Research of the University of Chicago.