$s_{20}° = ca\ 60 \times 10^{-13}$ associated with the immunizing principle.[4] Although $s_{20}° = ca\ 70 \times 10^{-13}$ from formolized diseased tissue is consistently highly antigenic, the actual immunizing principle involved may be unrelated to and only non-specifically associated with it.

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Glucuronic Acid Produced by Surviving Slices of Liver from Animals Poisoned with Phosphorus or Chloroform.

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It has been previously demonstrated[1] that surviving liver slices shaken in the Warburg apparatus in a saline phosphate medium (pH :7.4) produce conjugated glucuronic acids in presence of borneol, menthol or phenol. This production is significantly increased by the addition of sodium-lactate or pyruvate. The present investigation is concerned with the glucuronic acid synthesis by liver slices excised from guinea pigs poisoned with phosphorus or chloroform. Phosphorus poisoning was produced by the subcutaneous injection of 0.75 mg of yellow phosphorus (dissolved in olive oil) per 100 g animal weight. Other guinea pigs were injected with 0.03 to 0.035 cc of chloroform per 100 g animal weight on 2 successive days, and the livers were removed 3 days after the first injection. The glucuronic acid production of slices of these livers was determined with and without addition of sodium-lactate. The method was described in previous publications.[1]

As a result of phosphorus poisoning the addition to liver slices of lactate produced no significant increase in either the oxygen uptake or the glucuronic acid production. Histologically these livers showed fatty infiltration, swelling of the nuclei and, in the terminal stages of the poisoning, diffuse nuclear destructions and no signs of regeneration. The addition of lactate to liver slices poisoned with chloroform resulted in an increase of the oxygen uptake and of the

[4] Beard, J. W., Finkelstein, H., Sealy, W. C., and Wyckoff, R. W. G., *Science*, 1938, **87**, 89.

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[1] Lipschitz, W., and Bueding, E., *Proc. XVI Internat. Physiol. Cong.*, Zurich, 1938, 120; *J. Biol. Chem.*, 1939, **129**, 333.

TABLE I.
Liver Slices of Guinea Pigs Poisoned with Phosphorus or Chloroform.

		Qo_2		Mg glucuronic acid produced by 1 g of dried liver	
		Saline containing .01% borneol	Saline containing .01% borneol and .02 M lactate	Saline containing .01% borneol	Saline containing .01% borneol and .02 M lactate
20 normal controls	Limits	3.5-5.6	5.9-8.6	1.1-5.4	1.7-11.4
	Avg	4.8	6.9 (+44%)	2.85	5.05 (+77%)
10 guinea pigs poisoned with phosphorus	Limits	2.8-5.0	2.65-7.0	0.25-3.8	0.25-4.9
	Avg	4.05	4.7 (+16%)	1.8	2.0 (+11%)
9 guinea pigs poisoned with chloroform	Limits	3.9-8.8	6.4-10.7	3.0-6.95	5.4-11.2
	Avg	6.2	8.25 (+33%)	4.5	7.6 (+69%)

The figures in parenthesis show the percentage increases over normal.

glucuronic acid production, the percentage increase being equal to that observed in normal liver slices. Histological examination of these livers showed, in addition to fatty infiltration, a large number of hypertrophied nuclei and mitoses, signs of marked regeneration. A series of guinea pigs injected with the same doses of chloroform and which were not sacrificed for the experiments died spontaneously 3 or 4 days after the first injection. Their livers showed the same signs of regeneration. Animals observed for 2 days after the first chloroform injection showed no regeneration.

Conclusions. The mechanism of the glucuronic acid production of liver slices is disturbed during phosphorus poisoning. On the other hand, in the terminal stages of fatal poisoning by chloroform the glucuronic acid production is not disturbed since the addition of lactate produced a normal increase of glucuronic acid. This was associated with histological evidences of regeneration.