TABLE I

*Effect of Benedyne on yield of wheat and soil aggregation*

| Sl. No. | Treatment | Yield of wheat (q./ha.) | | Soil aggregates >0·25 mm. % |
|---|---|---|---|---|
| | | Grain | Straw | |
| 1 | Farmyard manure .. | 20·24 | 34·98 | 21·17 |
| 2 | Farmyard manure + Benedyne | 27·17 | 48·01 | 26·43 |
| 3 | Inorganic fertilizers | 31·36 | 55·46 | 20·76 |
| 4 | Inorganic fertilizers + Benedyne | 28·01 | 51·00 | 17·78 |
| | S.Em. | ± 1·31 | ± 3·06 | ±2·29 |
| | C.D. at 5% | 4·53 | 10·58 | N.S. |
| | C.D. at 1% | 5·82 | 13·59 | |

of grain and straw to the extent of 10·7% and 8·2% respectively as compared to inorganic fertilizers alone.

Soil aggregation analysis revealed that benedyne and farmyard manure resulted in maximum soil aggregation thereby suggesting that the increase in the yield of crop was ascribable mainly to the physical condition of the soil resulting from the application of the test material and organic manure. More intensive investigation to assess the effect of Benedyne on the physical condition of the soil and the increase in crop yield resulting from such improvement in soil structure is under investigation.

# THE INHIBITORY ACTION OF ALLOXAN IN THE EARLY DEVELOPMENT OF CHICK EMBRYO

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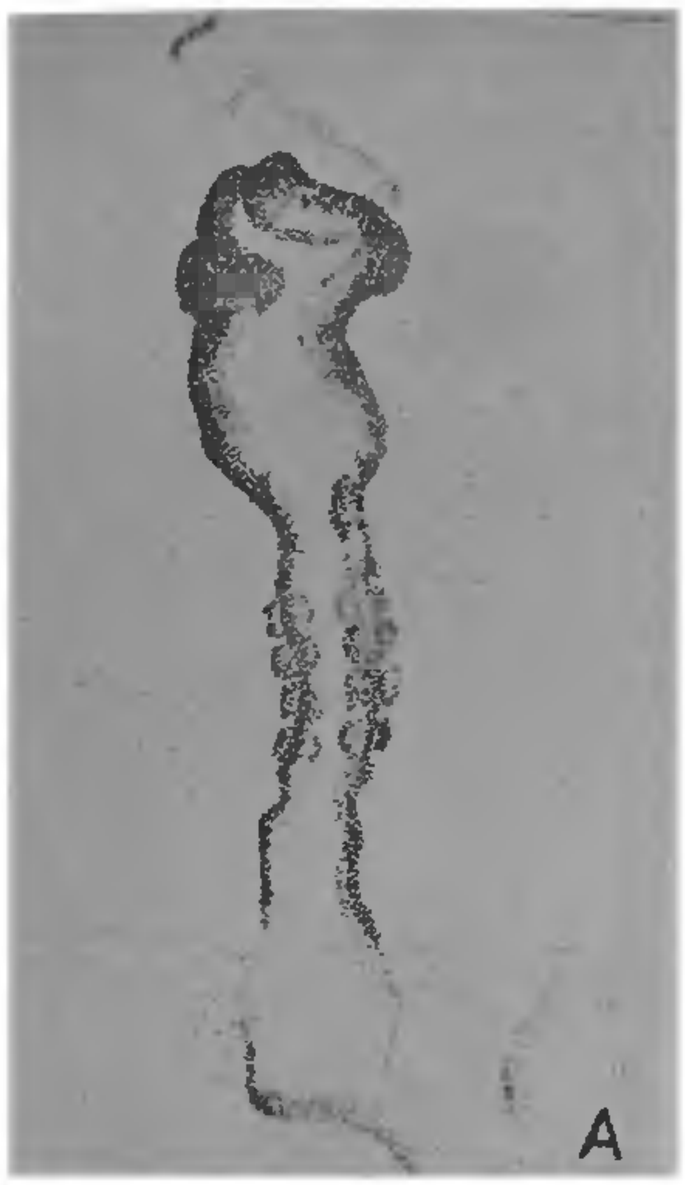
ALLOXAN-INDUCED maternal diabetes in animals has been studied by several investigators and various incidences of congenital malformations have been recorded.[1-3] Still there is no agreed opinion on the mechanism of action of alloxan in tissue metabolism, although the drug is known as an oxidising agent for thiols[4] and may therefore disturb the –SH metabolism of the embryos.[5] It was, therefore, felt desirable to study the action of alloxan on the early morphogenesis of chick embryos, and the reversal of its action by supplying the embryos with –SH groups.

The eggs were obtained from a white leghorn. After an initial incubation of 14 hours at 37·5° C., they were explanted *in vitro*.[6] Alloxan of concentration M/50 was applied directly on the ventral surface of the embryo. After treatment, the embryos were grown further for six hours. They were then washed carefully to remove all traces of alloxan. 0·1 ml. of fresh Pannett Compton solution was added and the embryos were incubated for further 20–21 hours. In the second set of experiments, the alloxan was removed after a six-hour treatment as described above and glutathione (–SH groups) was added inside the ring and the embryos were developed further.

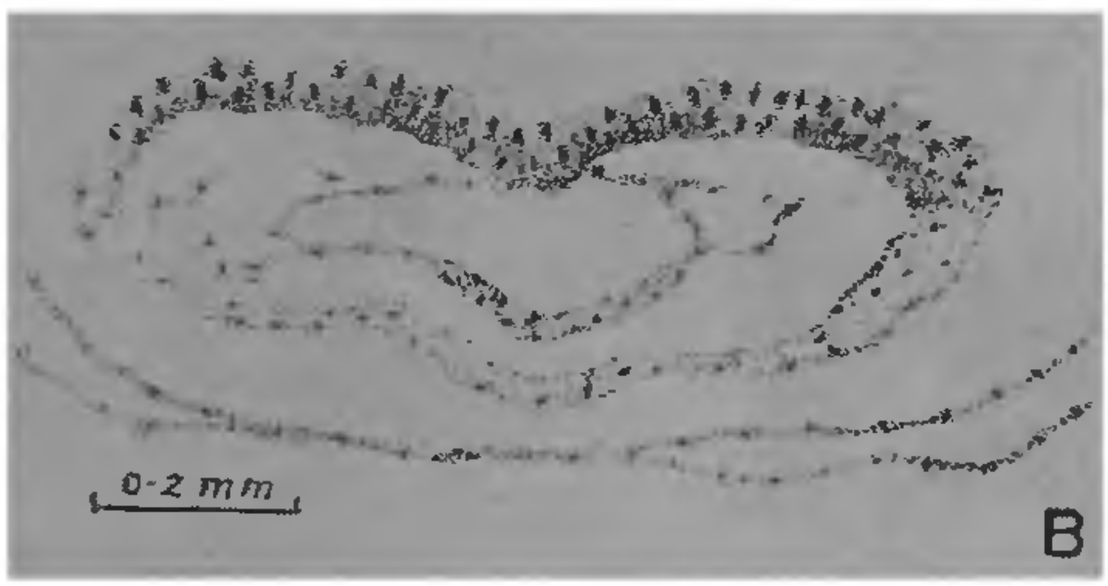
In all 100 embryos were used in the present investigation of which 50 were treated with alloxan alone and 30 with alloxan followed by glutathione. The remaining 20 embryos received no chemical treatment. Alloxan treated embryos showed abnormalities mainly in the brain region and neural tube, the latter remaining widely open along most of its length and the brain showing little or no differentiation into vesicles (Fig. A). Several sections of control and treated embryos confirmed that the neural tube in the treated embryo was wide open (Fig. B). The neural folds had formed but failed to meet and fuse in the mid-line.

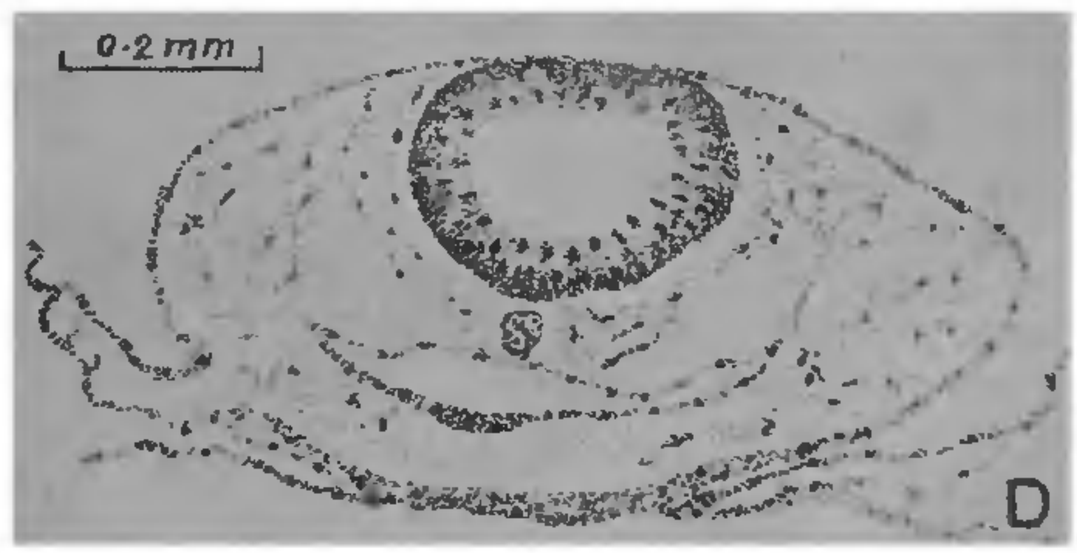
*Reversal with Glutathione.*—Two concentrations of glutathione were used ($5 \cdot 10^{-4}$ M and $4 \cdot 10^{-4}$ M). With each of these concentrations, the embryos were completely protected and resembled in every respect the controls (Figs. C and D).

Alloxan is suggested as an oxidising agent for thiols.[4] Administration of thiols (cysteine, glutathione, etc.) protects the embryos from alloxan diabetes, thereby indicating the importance of thiol groups in diabetes.[7,8] Lazarrow[8] believes that beta cells of pancreas are rich in –SH groups, which are necessary for the synthesis of insulin. Alloxan, by combining with those of –SH groups or oxidising them, would depress the insulin formation. The above results indicate that, for the normal growth and differentiation of the brain and








FIGS. A–D. **Fig. A.** Embryo treated with Alloxan at definitive streak stage. **Fig. B.** Transverse section through an embryo treated with Alloxan at definitive primitive streak stage. Note a wide open nural tube. **Fig. C.** Embryo treated with Alloxan at difinitive primitive streak stage followed by a treatment with glutathione. **Fig. D.** Transverse section of embryo treated with Alloxan at definitive primitive streak stage followed by treatment with glutathione.

neural tube, adequate quantities of –SH groups appear to be essential. The teratogenic effect of alloxan may be due to its oxidative or combining effect –SH groups. This assumption is further corroborated by the abolition of the teratogenic effect of alloxan in the chick explants with glutathione.

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