

TABLE II.

Dog 2. Wt. 6 kg.

Period of fasting	Nitrogen	Glucose	D/N	Total ketones	Remarks
	gm.	gm.		gm.	
1st 12 hrs. 3rd day	2.38	10.9	4.6	0.49	45 gm. sucrose by stomach tube
2nd 12 hrs. 3rd day	2.75	13.4	4.9	1.24	
1st 12 hrs. 4th day	3.50	54.7		1.76	
2nd 12 hrs. 4th day	3.37	12.7	3.72	1.71	

It had previously been found by one of us² that the excretion of the acetone bodies on the third and fourth days of fasting in 6 depancreatized dogs was as follows:

Period	Ketone body excretion					
	1	2	3	4	5	6
2nd 12 hrs. 3rd day	0.25	0.72	0.12	0.08	0.78	0.33
1st 12 hrs. 4th day	0.42	1.12	0.53	0.58	0.46	0.39

The results show that the antiketogenic action of carbohydrate does not obtain in the animal organism in the complete absence of insulin, and in view of the known fact that glucose stimulates the secretion of insulin in the normal animal, it is interesting to consider the possibility that the antiketogenic action of administered carbohydrate in *Diabetes mellitus* and in phlorhizin poisoning may be due to the ensuing secretion of insulin, which, it has been shown, lowers the ketone bodies of the blood following its injection to fasted, depancreatized dogs.³

¹ Wierzechowski, M., *PROC. SOC. EXP. BIOL. AND MED.*, 1925, xxii, 425.

² Chaikoff, I. L., *J. Biol. Chem.*, 1927, lxxiv, 203.

³ Chaikoff, I. L., Macleod, J. J. R., Markowitz, J., and Simpson, W. W., *Am. J. Physiol.*, 1925, lxxiv, 36.

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Return of Vision and Other Observations in Replanted Amphibian Eyes.

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Since Koppanyi¹ reported that vision returned in certain vertebrate eyes after replantation and transplantation, conflicting results have been published which show that return of vision as well as

other related problems is still unsettled. Technique in operation and handling of the replanted or transplanted eyes has much to do with its subsequent conditions. In such problems it is of value to know the existing conditions in both young and adult animals. We are pursuing the problem with this in mind.

Operations on *Amblystoma punctatum* larvae (19 to 23 mm.) and adult *Diemyctylus viridescens* are here reported. Chloretone anesthetic was used. The eyes were excised by finely sharpened ireductomy scissors and forceps manipulated under the compound dissecting microscope. Very little hemorrhage was encountered.

Return of circulation was first noted within superficial vessels in the iris, in *Amblystoma* larvae as early as 24 hours after operation, in *Diemyctylus* as early as the 5th day. Resorption of the eye could usually be predicted by known injuries to the bulb at the time of operation, or by too long use of anesthetic or a too strong anesthetic. Slight reduction in the size of the eye after operation always persisted in *Diemyctylus*, the maximum reduction being attained in about a month. In *Amblystoma* larvae reduction did not always take place. When it did there was usually rapid recovery. The cornea occasionally became opaque, but in most cases became clear about the time of observed return of circulation. All specimens of both types of amphibians kept several months after operation showed corneal reflex, when only the cornea was touched by a fine hair. In many *Diemyctyli*, 7 weeks after operation replanted eyes readily retracted when the cornea was so stimulated.

Return of ocular movements were found in both types of replanted eyes, in *Amblystoma* as early as 9 days after operation. Some replants showed restricted movements but in most cases movements seemed normal. The pupil in replanted larval eyes slightly dilated shortly after operation, later approaching normal size. In *Diemyctylus* the pupil gradually became maximally contracted within a month after operation. Later it approached normal size. The iris often cupped inward and appeared darkly pigmented. This was not observed in larval eyes. Replanted eyes showed pupillary reactions to light both in the presence and absence of return of vision and optic nerves. One *Amblystoma* and one *Diemyctylus*, in each of which there was return of vision and an optic nerve, showed no pupillary reactions.

Extreme care was taken in tests for return of vision to eliminate olfactory, gustatory, tactile and mechanical disturbances such as jarring or touching the aquarium. To test visual response, a piece of red rubber impaled on wire was moved about outside of a tightly

covered aquarium. Tests were made many times for several weeks by the investigators and disinterested observers. Each *Amblystoma* was metamorphosed when final tests for return of vision were made. Vision in the normal eye, if present in the tested operated animal, was eliminated either by a light-proof patch of celloidin and lamp-black placed over it, or it was extirpated. For comparison, controls were used, *viz.*, animals (a) with 2 normal eyes, (b) with 2 eyes extirpated and (c) with 1 normal eye and 1 extirpated.

Most animals with only the replanted eye exposed reacted like animals with normal eyes exposed. We have also found return of vision in replanted adult *Amblystoma* eyes. Although our data at present are incomplete, we have found that it can take place as early as 3 months after operation. They snapped vigorously at the moving source of stimulus or followed it about. Microscopic examination of such specimens showed an optic nerve from the bulb to and through the chiasma. Tests for return of vision proved negative (like blind animals) in a few cases and microscopic examination in these revealed no optic nerves. In some cases the regenerated optic nerve seemed normal (*Amblystoma*), in most cases (*Amblystoma* and *Diemyctylus*) smaller and usually tortuous.

The retinae of replanted eyes in both types of amphibians showed reduction of ganglion cells to about one-half normal number. Small spots often lacked these cells. *Amblystoma* killed within a month after operation began to show this change.

Phototactic responses, similar only to normal were obtained in only those cases (*Amblystoma* and *Diemyctylus*) where there was return of vision.

One case of a replanted larval eye showed return of vision in which the eye was rotated 90° anteroventrally, and 2 cases, in which the eye was rotated 180° anteroposteriorly, showed neither return of vision nor regenerated optic nerves. The eyelids developed in the rotated position. The retinae showed conditions similar to replanted larval eyes normally rotated.

¹ Koppányi, T., *Arch. f. mikr. Anat.*, 1923, xcix, 15-63.