TABLE 1. Acetylcholinesterase activities expressed as percent of normal in rabbits after intracarotid injection of DFP.

Tissue	Data Expressed as Percent of Control*		
	"Lefters"	"Righters"	"Neutrals"
Right cortex	20	27	86
Left cortex	90	54	88
Right caudate nucleus	3	6	82
Left caudate nucleus	83	84	98

* Nine rabbits were used for the control series and 6 rabbits for each of the other categories. "Lefters" turned away from the injected right side, "righters" turned toward the injected side, and "neutrals" did not exhibit compulsory behavior.

ity of acetylcholinesterase (AChE) in the parts of the central nervous system irrigated by branches of the common carotid artery (*5, 6*). This lesion evokes compulsory turning of the animal in a direction away from the injected side (*6, 7*). Although forced turning away from the injected right side ("lefters") is the pattern usually observed, it was noted that sometimes the direction of the turning is reversed, i.e., toward the injected side ("righters"), and in some cases the animal does not exhibit any compulsory behavioral pattern ("neutrals").

In our experiments 0.1 mg/kg of DFP was injected into the right common carotid artery of rabbits weighing approximately 2 kg, in order to study the enzymatic changes that were associated with the behavioral responses. The AChE activity of the frontal cortex and caudate nucleus on both sides of the brain was measured in animals exhibiting each of the three behavioral patterns. A series of control animals was obtained by substituting water for the DFP in the carotid injections.

After a 20-min period in which a single behavioral response became well established, the animal was sacrificed by an injection of air into the marginal ear vein. The tissue to be analyzed was then removed and the AChE activity was measured by a continuous titrimetric method. The enzyme activity was calculated and expressed as mg of ACh hydrolyzed per mg of wet tissue per min. A more detailed study and description of the method will be reported elsewhere.

The AChE activities are expressed as percent of normal in Table 1. The data reveal a general decrease of AChE activity in the tissues studied following the intracarotid injection of DFP. However, in "lefters" and "righters" this decrease was very much greater on the right side of the brain than on the left. This large difference between the two sides, or asymmetry of enzyme activity in the cortex and caudate nucleus, was noted in every rabbit that exhibited the circus movements irrespective of the direction. In "righters" the AChE activity for the left cortex is relatively low when compared to the "neutrals." However, the asymmetry of AChE activity between the left and right cortices is still present because the right side has suffered a far greater decrease than has the left. That this asymmetry of AChE is associated with forced circling is further emphasized by the fact that it is absent in the "neutrals."

We have thus been able, by the production of an asymmetric biochemical lesion, to duplicate behavioral patterns previously obtained by extirpation or by electrical stimulation of specific cerebral areas. We now find that a characteristic AChE pattern in the cortex and caudate nucleus is associated with each behavioral response. These results further support the concept that cortical and subcortical structures are involved in forced turning (*2*).

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Rotating Sector Method Applied to Reactions Induced by Co^{60} Gamma Rays

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Intermittent illumination has been extensively used in photochemistry but its application in radiation chemistry has been much more limited (*1*). This has been partly due to technical difficulties associated with the penetrating nature of the radiations used and partly to a lack of sufficiently strong sources of radiation. Hart and Matheson (*2*) obtained intermittent illumination of their samples by placing them on the circumference of a wheel rotated in front of an orifice in a lead shield behind which there was an 80-curie cobalt source. In the present work a rotating sector was constructed which could be placed between a 1000-curie cobalt source and the samples to be irradiated, thus allowing the samples to remain stationary during irradiation. The sector was a solid steel cylinder, 6 in. in diameter, 1 ft long, with two 60° sectors cut out on opposite sides. It was connected through a series of pulleys to a variable speed motor (see Fig. 1).

Two systems have been investigated, one molar aqueous chloral hydrate solution and chloroform saturated with water. These particular systems were chosen

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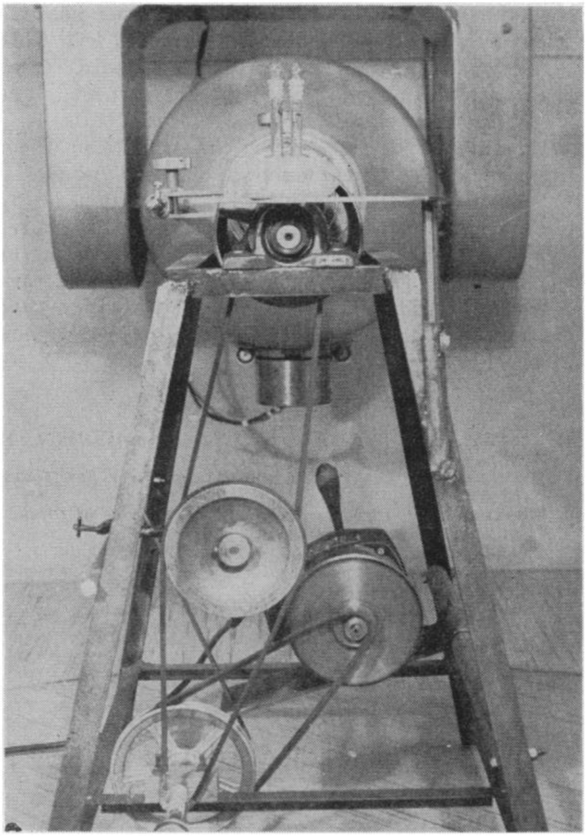

FIG. 1. Rotating sector and irradiation cells in front of Co^{60} bomb.

since they are chain reactions exhibiting a nonlinear dependence of rate of reaction on dose rate (*3*, *4*). The dose rate under constant irradiation was 1200 r/hour, and the dark to light ratio was 2 : 1. Pairs of samples were irradiated in the beam of gamma rays with the sector rotating at various speeds. The amount

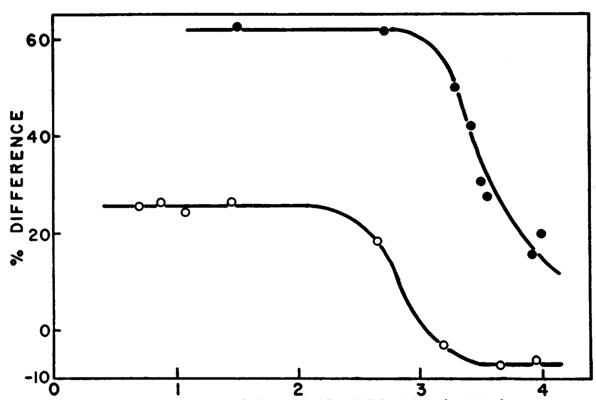

FIG. 2. Variation of acid production with length of irradiation period (all results referred to samples given the same dose continuously at the rate of 1260 r/hr) ○, chloral hydrate solutions; ●, chloroform saturated with water.

of acid found was compared with that found in pairs of samples irradiated in the beam for one-third the time with the sector stationary. The results are recorded graphically in Fig. 2 as

$$\% \text{ diff.} = \frac{(\text{acid formed when sector stationary}) - (\text{acid formed when sector rotating})}{(\text{acid formed when sector stationary})} \times 100.$$

The figure indicates that the average free radical chain lifetime in the chloral hydrate solution under these conditions was approximately 0.1 sec and that in the chloroform system was approximately 1 sec. These lifetimes are only approximate, since the reaction mechanisms are not known.

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Results of Dialyzing Some Fish Poisons[1]

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Clinical reports by Khlentzos (*1*), Lee and Pang (*2*), Larsen (*3*), Watanabe (*4*), and others indicate that ichthyosarcotoxins from many fish species are powerful neurotoxins. Japanese investigators have studied quite extensively the chemical properties of puffer toxin, which have been reviewed by Yudkin (*5*). However, the chemical and pharmacological properties of fish toxins exclusive of puffer poison have not been studied to any extent. General reviews of the overall problem of poisonous fishes and ichthyosarcotoxism have been written by Phisalix (*6*), Pawlowsky (*7*), and Halstead (*8*, *9*).

The present study was conducted preliminary to more extensive work on the chemistry and pharmacology of *Gymnothorax* (moray eel) and *Lutjanus* (snapper) poison. Specimen material consisted of fresh frozen Japanese puffer, ***Fugu rubripes chinensis*** (Abe), from Tokyo, Japan; cooked moray eel, *Gymnothorax* sp. indet., from Kwajalein, Marshall Islands; fresh frozen red snapper, *Lutjanus vaigiensis* (Quoy & Gaimard), from Palmyra Island; and fresh frozen *Caranx melampygus* Cuvier, from Palmyra Island. *Fugu* extract No. 1 (Table 1) was prepared from

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