to the basal R. Q. On the high carbohydrate diet, the excess R. Q. tends to approach unity, but is not necessarily unity even on this diet. On the "normal" diet, the excess quotient varies usually between 0.80 and 0.90. On the high fat diet, the basal R. Q. is in the neighborhood of 0.76 fairly consistently. The excess R. Q. goes as high as 0.78; in one experiment it was 0.72, in another 0.702, or practically the theoretical quotients for fat. It is difficult to regard this as coincidence, as a fortunate balance between the conversion of fat to carbohydrate with the subsequent oxidation of the latter, plus the burning of extra carbohydrate. Failing proof to the contrary, we are driven to the conclusion that fat is being burned directly. The fact that the R. Q. of a normal animal, exercising on any diet, never falls below approximately the theoretical value for fat, lends added support to this contention.

It appears that in the normal animal the proportion of fat and carbohydrate burned to supply the energy for muscular exercise is a function of the type of diet the animal has been ingesting, and that this holds true not only in severe exercise of long duration, but in a very mild exercise of very short duration as well.

This is a preliminary report.

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[1] Furusawa, K., Hill, A. V., Long, C. N. H., and Lupton, H., *Proc. Roy. Soc.*, 1925, xcvii, 167.

[2] Furusawa, K., *Proc. Roy. Soc.*, 1925, xcviii, 65.

[3] Krogh, A., and Lindhard, J., *Biochem. J.*, 1920, xiv, 290.

[4] Anderson, R. J., and Lusk, G., *J. Biol. Chem.*, 1917, xxxii, 421.

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The Influence of Ultra Violet Irradiation of Menotoxin and Pernicious Anemia Toxin.

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The phytopharmacological studies by the author of menstrual blood and of blood from pernicious anemia patients have revealed that both menotoxin[1] and the toxin present in the blood of pernicious anemia cases[2] are very poisonous for plant protoplasm. A consideration of various physical and chemical properties of these toxins indicates that they are not of the same nature. One of the most

striking differences between menotoxin and pernicious anemia toxin is shown by their reaction to treatment with ultra violet rays.

Specimens of blood serum from pernicious anemia cases were examined in regard to their toxicity by the author's method, and their phytotoxic index was determined. Other samples of the same sera were then irradiated with quartz lamps for periods varying from 10 to 40 minutes, and the toxicity of the serum was again determined. Exposure to ultra violet rays for even a short period of time markedly decreased the toxicity of these specimens. This detoxifying effect of ultra violet rays was increased to a high degree by the addition of various sensitizers, of which tetrabromfluorescein was one of the most efficient. By adding small quantities of tetrabromfluorescein or eosin to the serum, the photodynamic effect of the ultra violet rays was greatly intensified, and the sera were detoxified to a higher degree than by the rays alone. This suggested the application of ultra violet irradiation together with eosin to the treatment of clinical cases. The author has already reported a number of successful therapeutic results obtained by administering eosin to patients intravenously and giving them repeated general ultra violet irradiations.

The effect of ultra violet irradiations on menotoxin was found to be very different. Specimens of menstrual serum which exhibited marked toxicity for *Lupinus albus* seedlings were irradiated with a Krohmayer Mercury Lamp in exactly the same way as the specimens of pernicious anemia serum. Such menotoxin specimens showed that they were not at all detoxified by the ultra violet rays, and indeed gave some indication of an increased toxicity. Macht and Lubin[1] stated that there was some evidence pointing to the menotoxin being a cholestrin derivative and more probably an oxycholestrin. The evidence then presented agrees with the recent

TABLE I.
Irradiation with quartz lamp.

No.	Serum Examined	Exposure	Distance	Phytotoxic Index		Remarks
				Before	After	
1.	Pernicious anemia Serum	30 min.	35 cm.	48%	56%	
2.	Pernicious anemia Serum	30 min.	35 cm.	50%	62%	
3.	Pernicious anemia Serum	30 min.	35 cm.	44%	55%	
4.	Pernicious anemia Serum	30 min.	35 cm.	44%	64%	Eosin 1:100,000
5.	Pernicious anemia Serum	30 min.	35 cm.	44%	44%	Eosin 1:100,000 (in the dark)
6.	Menotoxin serum	30 min.	35 cm.	59%	58%	
7.	Menotoxin serum	30 min.	35 cm.	62%	58%	
8.	Menotoxin serum	30 min.	35 cm.	62%	60%	

findings of Okey and Boyden[3] concerning the fluctuations in the blood cholesterin in relation to the menstrual cycle, and also agrees completely with the much earlier findings in the extensive study of Goñalons.[4] It is well known now that ultra violet irradiations produce important changes in the physical and chemical properties of cholestrin, and as pointed out by Beumer,[5] one of the products formed as a result of such irradiation appears to be a substance exhibiting properties attributed by Lifschütz to oxycholestrin.[6] All these facts are of great interest when considered in connection with the effect of ultra violet on menstrual serum here described. The present findings corroborate the original views of the author, that menotoxin is chemically related to oxycholestrin. The table gives illustrations of some of the results obtained.

[1] Macht, D. I., Lubin, *J. of Pharmacol. and Exp. Therap.*, 1924, xxii, 413.
[2] Macht, D. I., *J. of Pharmacol. and Exp. Therap.*, 1926, xxix, 461.
[3] Okey, R., and Boyden, R. E., *J. Biol. Chem.*, 1927, lxxii, 261.
[4] Goñalons, G. P., *La Semena Medica*, 1916, No. 51.
[5] Beumer, H., *Klin. Wochenschr.*, 1926, v, 1962.
[6] Lifschütz, *Z. f. phys. Chem.*, cxvii.

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Neural and Chemical Control of Ciliated Epithelium.

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(Introduced by V. E. Levine.)

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Practically all workers upon ciliated epithelium have denied that it possesses a nervous control. It is generally held that this type of contractile tissue possesses the property of automaticity, like the heart, digestive organs, urinary bladder, etc., but that, unlike these viscera, it is independent of neural domination. Textbooks of physiology usually omit the question of control in discussing this tissue, and sometimes ignore the subject of ciliated epithelium altogether. Parker and others[1, 2] hold that nervous control of ciliated epithelium is extremely improbable. The histological features of this type of epithelium have been intimately worked out by histologists. A beautiful mechanism, apparently for inter-epithelium coordination, has been described by Grave and Schmidt.[3] Agersborg[4] has recently noted nerve fibers extendnig from the pedal ganglion (of Melibe)