individuals. After locating a germinating spore, under the microscope, by a small dot of ink placed adjacent to it, we followed its growth by a series of camera lucida drawings, all or half of each Petri dish having been exposed to the light. One hundred and seven experiments have thus been made, 42 on spores, 54 on mycelia and 11 on sporangia.

Under these conditions, 45 seconds irradiation brought about death of the spores, 15 to 45 seconds produced a delay in their germination and growth, and 10 seconds were absolutely ineffective. The same effects were produced on mycelia by 25, 5 to 25, and 4 seconds exposure, respectively. Mature sporangia, removed from the sporangiophores, have been irradiated singly, on a glass slide, for 3 hours. After exposure, germination proceeded normally.

The slowing up in growth, noticed after irradiation of spores and mycelium, is an increasing function of the period of exposure. We observed, in particular, that the greater the exposure the greater was the delay in appearance of sporangia. The radiosensitivity of mycelia did not vary, in these experiments, with their age.

The difference in sensitiveness to ultraviolet light between spores, mycelium and sporangia, already described for *Mucor hiemalis* in a previous notice,[1] has thus been confirmed here in *Rhizopus nigricans,* and extended to the wave-lengths of visible light.‡

4910

A Comparative Study of the Total Red Counts of Wild and Liver-fed Trout.

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Because of the use of liver as a food for young trout, it was suggested to the writer that a comparative study of the blood of wild and liver-fed trout might show the reaction of normal and growing animals to liver. Although the data are limited, the results indicate an increase in the total red counts of liver-fed trout.

Method. It is well known that fish blood is difficult to work with

[1] Luyet, B., *C. R. Soc. Phys. Hist. Nat. Genève,* xlvi, 2, 107.

‡ We express our gratitude to Professor R. G. Harrison for his suggestions and his kind assistance.

because it clots quickly, is easily contaminated with mucus, is relatively limited in quantity in small fish, and may change if the fish are out of running water for any length of time. Through the courtesy of the Massachusetts Department of Conservation, Division of Fisheries and Game, blood was obtained from wild trout at the Palmer Hatchery and from liver-fed trout at the Sunderland Hatchery. Haemoglobin determinations were made at the hatcheries but the pipettes for the total counts were brought back to the laboratory. The blood both for haemoglobin determinations and for total counts was taken directly from the ventricle or the sinus venosus into the pipettes.

Total Red Counts. Table I and Fig. 1 give the results of counts made on 11 wild trout and 17 liver-fed trout. Although the lengths of the two kinds of trout are about the same, those which were fed

TABLE I.
Wild Trout (approximately 1 year old).

Date	Number	Sex	Length in inches	Total Red per cmm.	Hb Tallquist
					%
4/14/28	2			1,800,000	
	3			1,670,000	
	4			1,440,000	
	5			2,080,000	
	6			3,120,000	
4/21/28	7		6¾	2,240,000	50
	8	Male	7¼	1,810,000	40
	9	Female	7½	2,060,000	
	10	Male	7¾	1,785,000	
	11	Female	5¾	1,930,000	35
	12	Male	5¾	2,280,000	30
Liver-fed Trout.					
5/12/28	13	Male	7¾	2,366,000	
	14	,,	7⅛	2,070,000	
	15	Female	7½	2,300,000	50
	16	,,	7¼	2,647,000	50
	17	Male	8¼	2,595,000	50
5/19/28	18	Female	7½	3,355,000	40
	19	Male	7¾	2,025,000	60
	20	,,	8	2,405,000	60
	21	,,	7½	2,140,000	60
	22			2,455,000	
	23	Male	7¾.	2,335,000	50
5/24/28	24	,,	8	2,895,000	
	25	,,	7½	2,665,000	60
	26	Female	7	2,360,000	60
	27	,,	7	2,595,000	50
	28	Male	7⅞	2,290,000	50
	29	,,	7½	2,675,000	50

In most cases 4 drops were counted from each pipette to obtain the total number of red cells.

liver possessed much more fat. While 6 of the 11 wild trout have counts less than 2,000,000, all of the 17 liver-fed have total numbers above that value. There appears to be no difference due to sex. The one count of 3,000,000 among the wild trout was obtained from a fish which had been in a bucket of water for one and a half hours before the blood was taken and was consequently very inactive. The mean of the counts for the wild trout is 2,020,000 ± 89,000; for the liver-fed, 2,480,000 ± 54,000. As the difference between the 2 means is 4 times its probable error, it would seem that the difference between the total counts of the wild and liver-fed trout may be significant.

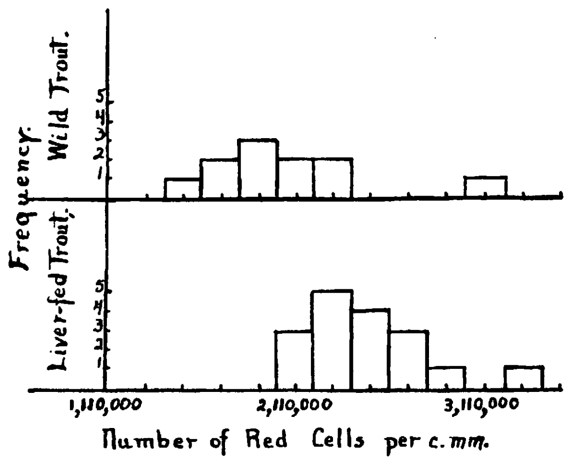

FIG. 1.
Diagram of frequency distribution of red-blood-cell counts in 11 wild trout and 17 liver-fed trout.

Haemoglobin Determinations. The results of this part of the work are quite unsatisfactory. In the majority of cases determinations were made with the Dubosc colorimeter and the Tallquist scale. The readings made with the Dubosc colorimeter have been discarded because, although an attempt was always made to use northern light, the lighting was not uniform, the yellow filter was not accurate, and there were other errors in adjustment. The values obtained by the use of the Tallquist scale give a general idea of the reactions of the liver-fed trout.

Discussion. A recent paper by McCay[1] gives some preliminary counts on normal fish from different genera and on individuals from the same species. The mean of the counts from the 9 genera is

[1] McCay, C. M., "A Biological Survey of the Erie-Niagara System." 1928. State of New York, Conservation Department, 1929. 140.

1,996,000 ± 127,000. The figures given for 5 carp, same species, are 1,600,000, 1,400,000, 1,700,000, 1,500,000, 1,800,000; for 3 bullheads, 2,800,000, 1,300,000, 1,300,000. From these few data and the results obtained in this study for wild trout, the conclusion would seem to be valid that the total red counts of the liver-fed trout tend to be higher. It seems likely that the liver diet is responsible for these high counts, but other factors may be influential. These factors may be differences in food, other than or in addition to the liver, which have also increased the deposition of fat in the liver-fed trout or they may be connected with the water content of the streams, the relation of which to the physiology of fish is little understood.

4911

Vasomotor Control of the Liver Circulation.

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Our present knowledge of the vasomotor control of the liver circulation is curiously inadequate. In due time the evidence for this conclusion will be reviewed in detail; now we wish merely to record a summary of the results which have been obtained during the last couple of years in a study of this problem, using cats under chloralose anesthesia and the liver plethysmograph previously referred to.[1, 2]

The peripheral vagus has no effect on liver volume; we have stimulated it in the neck (after denervating the heart according to Cannon's method), below the heart in the thorax and after emerging through the diaphragm.

The postganglionic fibers of the hepatic plexus constrict not only the terminals of the hepatic artery but also those of the portal vein.

The preganglionic fibers of the splanchnic (left) have exactly the same effect on liver volume, either by way of the artery or portal vein, as stimulation of the postganglionic fibers in the hepatic plexus.

Reflex pressor responses are accompanied by decreased liver volume; depressor reflexes produce dilation in the liver. If, however, the liver is denervated by cutting the fibers of the hepatic plexus, its volume then follows passively the general blood pressure.

During the generalized vasomotor activity induced by asphyxia

[1] Griffith, York and Zachmys, PROC. SOC. EXP. BIOL. AND MED., 1928, xxv, 399.

[2] Griffith and Emery, *Ibid.*, 1929, xxvi, 628.