efferent fibers are present and that reflex arcs exist within the wall of the intestine.

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Influence of Serum From Pernicious Anemic Persons Treated by Liver on Growth of Seedlings.

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The nature of the therapeutical effect produced by liver in cases of pernicious anemia is still under discussion, and we desired to establish whether the toxicity of blood of such patients undergoes any changes under treatment by liver, in order to determine the character of its influence on the blood.

We used the toxic blood of patients suffering from pernicious anemia, which impeded abruptly the growth of seedlings of *Lupinus albus* in the Shive nutritive solution, Macht.[1] We used the methods suggested by Macht, except that for the germination of *Lupinus albus* seedlings we used boiled sawdust instead of sphagnum moss.

We determined the phytotoxic index in 7 cases of pernicious anemia treated with liver during 7 to 12 months with excellent effect. Whereas before the treatment the patients all showed severe symptoms of typical pernicious anemia, after the above periods they were all entirely efficient, clinically healthy, and the picture of blood did not show any deviations from the norm. They did not stop taking liver, and yet we discovered in all cases very pronounced phytotoxicity of serum, such as Macht found in cases of untreated pernicious anemia studied by him, afterwards confirmed in our further experiments.

The phytotoxical index varied in 6 cases from 46 to 50%, and in one case was as high as 54%. The latter case showed a propensity to spontaneous remission even before the beginning of liver treatment. In 2 untreated cases the index was 46 and 47%, and in one case after a week's treatment it was 46%. Finally, in one case, after 7 weeks' treatment by liver the index went up from 46 to 51%. Besides this last mentioned case, we have at present none at our disposal in which the variations of index could be determined dur-

[1] Macht, *J. Pharmacol. and Exp. Therap.*, 1926, xxix, 461.

ing the treatment, and we therefore refrain from coming to a conclusion regarding the possible diminution of phytotoxicity in the first period of treatment. Nevertheless, the fact that Macht[2] too observed some diminution of phytotoxicity of blood after a comparatively short liver treatment (2-4 weeks) deserves attention.

Thus, liver treatment, in its stereotyped form as applied at present, neither affects the phytotoxicity of blood, nor has any influence on *achylia* (Heath[3]) and *megalocythemia* (Etinger and Artinov[4]). These observations strengthen the grounds for denying the causative nature of liver treatment.

Why Upjohn, Isaacs and Gustafson[5] did not observe any abrupt increase of phytotoxicity of blood in cases of pernicious anemia remains unsolved. In our cases we (as well as Macht) not only found the average phytotoxical index much lower than those authors (48 instead of 76.6% of Upjohn and others), but also discovered that the amplitude of variations of phytotoxic coefficients, obtained from the same blood, with regard to all the seedlings used in the above experiment, had a different interval. In our cases this interval varied from 33 to 60%, whereas in the Upjohn, Isaacs and Gustafson experiments its amplitude varied from 59 to 94.3%.

The question of specificity of the above phenomenon must be answered in the negative, inasmuch as it has also been determined in cases of menstruation (Macht and Lubin[6]), and otosclerosis (Stern[7]), some psychoses (Herz and Weichbrodt[8]) (Looney and Macht[9]), and pemphigus (Macht and Pels[10]).

This phenomenon must be regarded only as a proof of the presence in the blood of substances highly toxic for vegetable protoplasm. The nature of these substances can evidently vary and they may be differentiated in other ways. This does not impair the usefulness in doubtful cases of the phytotoxic index for differential diagnosis, as in all the studied cases of diseases of hemopoietic system (Macht,[2] Tscherkes and Goldstein[11]), phytotoxicity does not exceed that of normal man. In our observations, the blood of pa-

[2] Macht, *J. Am. Med. Assn.*, 1927, lxxxix, 753.

[3] Heath, *J. Am. Med. Assn.*, 1928, xci, 928.

[4] Etinger and Artinov, *Vratckebnoye Dielo*, 1928, ix, 1408.

[5] Upjohn, Isaacs and Gustafson, *Arch. Int. Med.*, 1928, xlii, 909.

[6] Macht and Lubin, *J. Pharmacol. and Exp. Therap.*, 1924, xxii, 413.

[7] Stern, *Munch. Med. Woche*, 1926, lxxiii, 101.

[8] Herz and Weichbrodt, *Deut. Med. Woche*, 1924, l, 1210.

[9] Looney and Macht, *J. Biol. Chem.*, 1925, lxiii, Proc. lx.

[10] Macht and Pels, PROC. SOC. EXP. BIOL. AND MED., 1927, xxv, 237.

[11] Tscherkes and Goldstein, *Deut. Med. Woche*, 1929, lv, 434.

tients suffering from cancer did not show higher toxicity than the blood of healthy individuals, and in this respect our data could not confirm Stern's observations.

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Urethane—Rat Preparation for Study of Intestinal Peristalsis.

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The following method of studying peristaltic movements of the intestines *in situ* has been found extremely useful by the writers in connection with an investigation of certain purgatives and is deemed worthy of description for the benefit of other investigators because it is simple, efficient and economical.

A white rat, previously starved for 24 hours, is anesthetized with an intraperitoneal injection of urethane. This anesthetic has been found by the writers to act with extraordinary rapidity in the rat, so that an injection of 1.25 gm. (using a 4% solution) per kilo weight of rat produces complete and deep anesthesia within 5 minutes, lasting for 5 or more hours without any appreciable depressant effect on the heart or respiration. Doses of 1.5 gm. per kilo produce an anesthesia lasting for 24 hours or more, while 1.0 gm. per kilo produces an anesthesia of shorter duration. The rat is tied on a small dissecting board and immersed in physiological saline solution at body temperature, care being taken to keep the head out of the water. A median incision is made through the abdominal wall, without producing any bleeding, and the intestines are allowed to float on the saline solution. For the study of the intestinal movements and the passage of food through the gastro-intestinal canal, a small quantity of India ink (0.5 of 1.0 cc.) is introduced directly into the stomach by injection through a fine catheter passed through the mouth and oesophagus into the stomach. The passage of food and gastric contents through the intestinal tract of the rat is a very rapid one, the whole length of the intestine being traversed ordinarily in an hour's time. This passage, or movement, of the intestinal contents mixed with the India ink or finely divided carbon particles can be plainly followed with the naked eye because the thin intestinal walls of the rat allow the dark contents to be seen through