grams. On the 80th day, each animal was given 2,000 *N. muris* larvae and was sacrificed 12 days later. Post-mortem determinations revealed a complete depletion of vitamin A in the liver and low vitamin A levels in the blood of the animals on the vitamin A-deficient diets. More worms were found in the intestines, but fewer worms in the lungs, of these animals; in the control animals the reverse condition was seen. See Table 1.

TABLE 1

Experiment	Dietary group	Blood Vit. A μ gm. per cent.	Liver Vit. A μ gm. per liver	Worms found at autopsy: No. in intestine	Worms found at autopsy: Mean per cent. infection	Worms found at autopsy: In one lung
I.	*Diet I*					
	a. (− Vit. A)*	4.8	5.5	2013.33‡	87.53	
	b. (+ Vit. A)*	29.3	215.0	1656.50	72.01	
	Diet II					
	a. (− Vit. A)*	6.3	3.4	2201.25§	95.77	
	b. (+ Vit. A)*	21.8	271.5	1654.17	71.92	
II.	*Diet I*					
	a. (− Vit. A)†	6.3	7.8	159.40	7.97	27.00
	b. (+ Vit. A)†	27.5	205.56	12.60	0.63	72.20
	Diet II					
	a. (− Vit. A)*	5.6	8.4	204.33	10.22	23.8
	b. (+ Vit. A)*	22.7	310.98	13.83	0.69	59.5

* Represents mean values for 6 animals.
† Represents mean values for 5 animals.
‡ Represents mean values of 3 surviving animals.
§ Represents mean values of 4 surviving animals.

Experiment 3. The effect of vitamin A depletion upon the passive transfer of immunity. In order to test the influence of vitamin A deficiency upon the efficacy of plasma from "hyperimmunized" rats, each of the two groups of normal rats, the average weight of which was about 75 grams, was infected with approximately 600 larvae, and concurrently was administered an intraperitoneal dose (5 cc per 100 gms body weight) of plasma. When the animals were sacrificed 12 days later, post-mortem determinations revealed that animals that had been given plasma from "hyperimmunized" rats fed on vitamin A-deficient diets had more worms in the intestines (average 319.33 worms per rat) and fewer worms in the lungs; while reverse conditions existed in rats given plasma from "hyperimmunized" rats fed on adequate diet with supplementary vitamin A (average 168.6 worms per rat in intestines, with more worms in the lungs).

Conclusions

The above results indicate that the lack of vitamin A in the diet of the experimental animals lowers their resistance to primary infection, as well as subsequent reinfection, with *Nippostrongylus muris*. Furthermore, plasma derived from animals with low vitamin A levels affords no protection against this parasite in the way of positive transfer of immunity. In contrast, the rats fed on the same diet, plus vitamin A supplement, developed a marked resistance to infection with this nematode, such as has been described by Schwartz *et al.*,[5] in addition to protection rendered normal rats by plasma from "hyperimmunized" rats, as previously demonstrated by one of us.[6]

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STUDIES REGARDING A GLUTAMINE-LIKE SUBSTANCE IN BLOOD AND SPINAL FLUID

In view of the recent communication of Hamilton,[1] regarding the presence of a glutamine-like substance in the blood, it may be of interest to note some studies which we have been carrying on during the past few years regarding substances in the blood and spinal fluid which split off ammonia readily on mild acid hydrolysis.[2] We have found that spinal fluid, trichloracetic acid filtrates of blood plasma and serum, and ultrafiltrates of plasma and serum contain a substance which yields ammonia under the treatment indicated. It was also found that the rate of hydrolysis of this substance under a variety of conditions of acidity and temperature was practically identical with that of glutamine which we had prepared from beet root.[3] A quantitative method based upon those findings was developed which has been used up to date in a study of a rather large amount of clinical material and also in animal experiments.

The findings in our blood studies in man and rabbit are in keeping with those of Hamilton,[1] namely, that the amount of ammonia liberated is equivalent approximately to from 5 to 10 mg of glutamine per 100 cc of plasma or serum. It has also been found that spinal fluid contains similar amounts of this substance. This together with the studies with ultrafiltrates we believe is added evidence that the findings for blood filtrates are not due to artefacts resulting from its chemical treatment. Our method also rules out the possible presence of any appreciable amount of asparagine in the material studied.

It has been found further that insulin hypoglycemia and also the administration of glucose reduces the

[5] B. Schwartz, J. E. Alicata, J. T. Lucker, *Jour. Wash. Acad. Sci.*, 21: 259, 1931.
[6] J. Y. C. Watt, Abstract of Doctor's Thesis, Cornell University Press, 1942.
[1] P. Hamilton, *Jour. Biol. Chem.*, 145: 711, 1942.
[2] M. M. Harris, Tenth Annual Report of the Director of the New York State Psychiatric Inst. and Hosp., p. 41, 1940.
[3] H. B. Vickery, G. W. Pucher, H. E. Clark, *Jour. Biol. Chem.*, 109: 39, 1935; *Biochem. Jour.*, 29: 2710, 1935.

level of this substance in the blood, the effect of the former being more marked. The sparing action on protein metabolism by these factors is of special interest in this connection.

These findings support the suggestion which we made in a previous publication,[4] namely, that the depression of the level of the amino acids in the blood during insulin hypoglycemia may be due in part to its effect upon some point in the mechanism of the enzymatic activity of glutaminase.

The administration of certain amino acids such as (dl) α-alanine increased the level of this substance in the blood. Glycine, on the other hand, produced no effect in some animals and a variable increase in others. The reason for this variability is not clear at present but may be of importance regarding the question as to whether glycine undergoes deamination. Other amino acids are being investigated.

The findings of Krebs[5] that brain, liver, kidney and retina are rich in glutaminase activity and also the work of McIlwain[6] in which he isolated glutamine from horse meat lend added support to the probability that the glutamine-like substance is glutamine.

Our studies are still in progress and some of the clinical and experimental data will soon be published.[7]

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A PROMISING NEW SOIL AMENDMENT AND DISINFECTANT[1]

THE serious crop losses suffered by growers as a result of injuries to plants by specific organisms in the soil indicate the need for a low-cost disinfectant which could be applied as an insurance measure in soils suspected of harboring such organisms. This need is particularly great where prediction of damage can not be made prior to planting or in areas where the incidence of such damage is spotty or where the economics of the crop preclude the use of expensive materials.

Preliminary results obtained by the use of a mixture of 1–3 dichloropropylene and 1–2 dichloropropane indicate that this material promises to fill this need. The material used in these experiments was obtained from the Shell Development Company at Emeryville, California, from whom it is available in two grades, one an approximately 50–50 mixture of the two compounds, and the other a crude form containing about 75 per cent. of the mixture, the balance being impurities of various kinds. It is low-priced compared with any competing product and, compared with chloropicrin, is extremely simple to handle. It is shipped in ordinary 55-gallon drums and can be handled without the use of a gas mask in the open air. In common with similar compounds, breathing of the fumes should be avoided and the precaution taken of promptly washing off with water any of the mixture which might be spilled on the hands or skin. No other commercial use for the material has thus far been found and no priorities are currently involved in its manufacture.

Tests with rapidly maturing vegetable crops grown in soil heavily infested with the root-knot nematode (*Heterodera marioni*) have shown that a very real measure of control has been obtained, not only in the plot which was covered with asphalt impregnated paper used as a mulch paper before treatment, but also in a parallel plot which received no seal of any kind either prior to or after the treatment. This is particularly important when the needs of the small grower are considered. In these tests, injections were made at intervals 1 foot apart, the amount per acre being approximately 200 pounds. Furthermore, in these tests, the crude form of the mixture was used. This crude form contains some impurities, but its manufacture involves fewer processes and it is therefore cheaper.

Experiments in pineapple fields have been conducted since the spring of 1940. In these experiments, a dosage of 150 pounds of the mixture in pure form per acre was used and injections were made through the mulch paper. The results thus far have shown that in all the locations in which the treatments were applied, definite and favorable response in growth has been obtained. The results are particularly striking in an area where a complex, including at least *Anomala* beetle larvae (*A. orientalis*), nematodes and pythiaceous fungi, has resulted in serious plant failure. In all cases, the results can be compared with those from equivalent applications of chloropicrin and, without exception, the new treatment is at least equal to that material in its benefits.

[4] M. M. Harris, J. R. Blalock and W. A. Horwitz, *Arch. Neurol. and Psychiat.*, 40: 116, 1938.

[5] H. A. Krebs, *Biochem. Jour.*, 29: 1951, 1935.

[6] H. McIlwain, P. Fildes, G. P. Gladstone, and B. C. J. G. Knight, *Biochem. Jour.*, 33: 223, 1939.

[7] M. M. Harris, *Jour. Clin. Investigation* (in press). July, 1943.

[1] Published with the approval of the acting director as Technical Paper No. 145 of the Pineapple Research Institute, University of Hawaii.