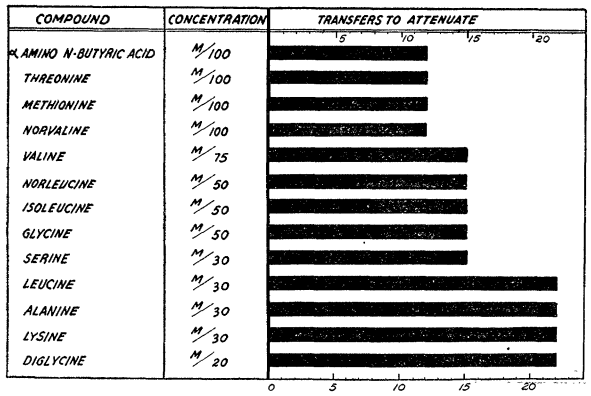

FIG. 1. Attenuating compounds, concentrations used in mannitol-nitrate-mineral-salts medium, and number of successive transfers necessary to attenuate single-celled virulent crown-gall cultures. The concentrations given were the highest used.

cally active amino acids were studied except with leucine. In this case both the l- and dl-compounds were found active. Except for phenylalanine there was direct correlation between inhibition of bacterial growth and attenuation.

Thus all the attenuating amino acids were aliphatic in nature. With the exception of lysine they contained only single amino and carboxyl groups. The other diamino mono-carboxylic acids, the mono-amino di-carboxylic acids and the cyclic amino acids were inactive. Although glycine was active, the ethyl ester of glycine, the anhydride of glycine and sarcosine were inactive. This indicated that the free amino and carboxyl groups might be required for attenuation. Also since diglycine was less effective than glycine and triglycine was inactive the length of peptide chain appears influential.

Glycine and alpha amino n-butyric acid did not specifically inhibit glucose or succinate dehydrogenase, aspartic acid deaminase or aerobic respiration in the Warburg respirometer. The active amino acids likewise did not specifically inhibit the peptidases splitting leucylglycine, leucyldiglycine or alanyldiglycine.

Over 1,000 attenuated cultures have been produced during these studies.

The details of these investigations will be published elsewhere. Meantime, this preliminary statement is given because of its bearing on such basic problems as (1) the attenuation of pathogenic bacteria, (2) the physiological specificity of the amino acids and (3) the mechanism of atypical and pathological cell growth.

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LOCALIZATION OF CHOLINE ESTERASE IN NERVE FIBERS

RECENT investigations have revealed that choline esterase is highly concentrated in all nerve fibers, but rises to strikingly high concentrations at synapses and motor end plates.[1,2] Previous observations on the superior cervical ganglion of cats, after section of preganglionic fibers, and on denervated muscles of guinea-pigs[3] suggested strongly that the enzyme may be concentrated at or near the surface of nerve cells. In these experiments the concentration in preganglionic fibers inside the ganglion appeared to be several times as high as the concentration in the same fibers before they enter the ganglion. This increase was interpreted as possibly being connected with the increase of surface due to the extensive end-arborization of preganglionic fibers in this ganglion.

Direct evidence that choline exterase is highly concentrated at or near the surface of nerve fibers has now been obtained. The enzyme activity has been determined separately in the axoplasm and the sheath of the giant fiber of the squid (*Loligo paealii*). The method used was the Cartesian diver technique as developed by Boell, Needham and Rogers.[4]

Practically the total enzyme activity is found in the sheath, whereas the amount of enzyme present in the axoplasm is negligible. The figures obtained in one experiment are given in Table 1.

TABLE 1

	Material in mg fresh weight per diver	Output of $CO_2 \times 10^3$ cmm in 160 min.	$Q_{CH \cdot E \cdot}$* (average)
Whole axon	0.123 0.123	53 69	0.150
Sheath	0.09 0.09	135 115	0.420
Axoplasm	0.20 0.20 0.20	8 28 18	0.027

* $Q_{CH \cdot E \cdot}$ = mg. ACh split by 100 mg tissue in 60 min. t = 27.5° C.

As at least 80 to 90 per cent. of the sheath is connective tissue,[5] the values obtained for the sheath have to be multiplied by at least 5 to 10 times. The enzyme concentration may be actually much higher than the activity per unit of tissue weight indicates,

[1] D. Nachmansohn, *Bull. Soc. Chim. biol.*, 21: 761, 1939.
[2] D. Nachmansohn, *Yale Jour. Biol. and Med.*, 12: 565, 1940.
[3] R. Couteaux and D. Nachmansohn, *Proc. Soc. Exp. Biol. and Med.*, 43: 177, 1940.
[4] E. J. Boell, J. Needham and V. Rogers, *Proc. Roy. Soc.*, (B) 127: 322, 1939.
[5] Personal communication from F. O. Schmitt. See also figure in Bear, Schmitt and Young, *Proc. Roy. Soc.* (B) 123: 496, 1937.

because the enzyme may be localized in a small fraction of the remaining volume. The figures found for the activity of the total giant fiber are, as could be expected, intermediate between those for the sheath and those for the axoplasm.

The experiments bring evidence for the high concentration of the enzyme at or near the surface of the nerve cell. They suggest that the activity of nerve cells is connected everywhere at or near the surface with the metabolism of acetylcholine and that the phenomenon is only quantitatively more important at synapses. This would explain the findings of Lorente de Nó[6] that acetylcholine can be liberated from fibers as well as at synapses and is compatible with the conclusion of Gasser and Erlanger[7,8] that conduction of nerve impulses along fibers and across synapses differs only quantitatively.

We are greatly obliged to Dr. H. B. Steinbach for the dissection of the fibers.

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FELINE PELLAGRA[1]

IN recent years, a large number of investigators have shown that nicotinic acid is essential for the health and well being of dogs,[2,3,4] pigs,[5] monkeys[6] and human beings,[7,8] but so far as we have ascertained no studies have been reported of its role in the nutrition of cats.

The present communication describes typical symptoms of nutritional deficiency in cats which are relieved dramatically following a daily oral dose of 80 to 100 milligrams of nicotinic acid.* Each of the six cats studied had lost weight and refused food. They appeared weak, sluggish, apathetic, and usually the head hung much lower than the rest of the body. They made no effort to move even when poked, and offered no resistance to hyperextension of the mouth and other physical manipulation. Examination of the oral cavity presented a peculiar yet typical appearance, characterized by an ulcerated, reddish margin in the upper part of the palate close to the midline, and a tongue that was very red over the terminal portion. Thick saliva of an extremely foul odor drooled from the mouth. Each animal had an elevation in temperature of around 3 to 5 degrees.

Within 48 hours following the administration of nicotinic acid, there was a return of appetite, subsidence of symptoms and disappearance of the oral lesions, and the temperature became normal.

The following representative case history describes the symptoms of feline pellagra and illustrates the dramatic response of an affected cat to nicotinic acid therapy.

A fourteen-month old male cat was brought to the veterinarian on August 10, 1940. For two days he had refused all food, had slept most of the time, and had remained in one place unless forced to move. His temperature was 105.8° F. The tongue was fiery red in color. The anterior border of the tongue showed an area about ¼ inch wide of ulceration and congestion. There was slight congestion and a few small ulcers in the throat. A small amount of thick saliva drooled from the mouth.

This animal was given orally 80 milligrams of nicotinic acid for two days, at the end of which time the tongue began to clear, his throat became normal and the drooling ceased. He began moving around in the cage voluntarily. By the third day, the tongue had resumed its normal color, and the cat appeared normal in every way. He drank milk and was able to eat canned food. He was dismissed from the hospital at this time, and a daily oral dose of 30 milligrams of nicotinic acid was prescribed for the next four days.

Summary. The present communication describes a deficiency disease in cats which responds promptly and dramatically to the administration of nicotinic acid.

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STRUCTURE–PROTEINS

IT is generally believed that fibrous protein molecules are found only in tissues having a mechanical function, like hair (keratin), muscle (myosin), tendon (elastin). Most of the other proteins studied have been found to be globular.

The globular shape entails a certain mobility; the rod shape an ability to form solid structures. Accord-

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9 This work was made possible by a grant of the Dazian Foundation.
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* Supplied through the courtesy of Merck and Company, Rahway, New Jersey.