sibly because it is superimposed upon the non-catalyzed hydrogen wave of the buffer acid (*cf.* Fig. 1), and is of such magnitude that the maximum goes unnoticed unless a low galvanometer sensitivity is employed. The values of current shown in Table 1 are corrected for the non-catalytic buffer current.

It should be pointed out that the polarographic effect of thiamine described here is entirely distinct from the thiamine wave which Bergh *et al.*[11] discovered to be partly responsible for the polarographic cancer serum reaction. The latter wave occurs in ammoniacal cobalt solution at a more positive potential than the present wave, and is much less sensitive to the presence of thiamine. It closely resembles Brdička's[12] catalytic sulfhydryl waves, and in the opinion of the writer is due to the sulfhydryl group of the thiol into which thiamine rearranges on treatment with alkali.[13]

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THE NUTRITIVE VALUE OF FUSARIA[1]

EXTENSIVE studies have been made on the enzymatic performances of members of the *Fusarium* family.[2] We were particularly interested to find that some Fusaria were capable of synthesizing thiamin.[3] With a view to ascertaining whether these organisms could synthesize also the other members of the vitamin B complex, a study of the food value of Fusaria has been carried out.

It has been well established that brewer's yeast at a 10 per cent. level in a synthetic diet supplies sufficient amounts of the B complex, so that normal growth, reproduction and lactation in mice are obtained.[4] The first experiment which, therefore, suggested itself was to determine whether Fusaria could adequately replace brewer's yeast in such a purified ration.

In these experiments two strains of the genus Fusarium were used, *viz.*, *Fusarium lini* Bolley (FlB) and *Fusarium graminearum* Schwabe (*Gibberella Saubinettii*) (Fgra). The Fusaria were grown on an artificial stock culture medium[5] containing glucose. After a growth period of three weeks in a sterilincubator, the mats were removed, washed with water, air dried and ground up into a powder. This powder was incorporated into the diets. The percentage composition of the experimental diets used is given in Table 1.

TABLE 1

	Diet V–3	Diet V–4
Purified casein (Smaco)	25	25
Sucrose	45	45
Salts (Osborn and Mendel)	5	5
FlB	10	..
Fgra	..	10
Crisco	7	7
Lard	5	5
Cod liver oil	3	3

The mice used in these experiments were of two strains, *viz.*, the Rockland black and an albino strain raised in these laboratories. They were placed on the experimental diets at weaning. Eleven mice were placed on the V-3 diet, and seven animals received the V-4 diet.

The V-4 diet containing Fgra was totally inadequate for growth in both strains. The animals ate very little of the diet and died within three weeks. The V-3 diet containing FlB, on the other hand, proved to be excellent for growth in both strains of mice over a period of 30 to 35 days. The growth during this period was superior to that obtained with diets containing 10 per cent. brewer's yeast. The food intake averaged 3–3.5 grams daily. After the first month on this diet, however, growth fell off and a loss in weight occurred. The daily food intake dropped to 1–1.5 grams. Since this loss in appetite suggested a possible thiamin deficiency, a supplement of this vitamin (10 micrograms daily) was either injected or fed. An immediate resumption of growth occurred, and the food intake was tripled over night. An effect comparable to the injection of Vitamin B_1 was obtained when the amount of FlB in the diet was doubled. FlB contained[3] about 20 micrograms of this vitamin per gram of dried material so that approximately 2 micrograms were present in one gram of the diet.

It should be noted that Fgra, which was totally inadequate as a source of the B-complex vitamins, was found to contain only 5 micrograms of vitamin B_1 per gram of dried material, thus supplying 0.5 micrograms per gram of diet. However, thiamin is not the only deficient vitamin that is responsible for the insufficiency of the Fgra diet, since a supplement of

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[5] F. F. Nord *et al.*, *Proc. Nat. Acad. Sci.*, U. S., 29: 121, 1943.

vitamin B_1 did not have any beneficial effect. In order to rule out the possibility that a toxic factor[6] might be present in the dried mycelia, the Fgra diet was fortified with adequate quantities of the crystalline B complex vitamins.[7] Six mice fed this diet grew satisfactorily. It would appear, therefore, that the inadequacy of Fgra in the diet was due only to a multiple vitamin deficiency and not also to some emetic principle.

In order to study the effect of FlB during lactation, three female mice raised on the diet V-3 were mated when 75 days old. They were given daily supplements of 100 micrograms of Vitamin B_1. Gestation and lactation were normal for the three mice. These results indicate that diet V-3 containing 10 per cent. FlB as a source of the B-complex vitamins when supplemented with thiamin is adequate for growth, reproduction and lactation in mice. The thiamin content of Fusaria can be, of course, increased by adding vitamin B_1 to the cultures.[8]

In order to determine the nutritional value of the protein in FlB a ration (Diet V-6) was prepared in which FlB supplied, in addition to the B-complex vitamins, the sole protein of the diet. It consisted of 40 per cent. FlB, 40 per cent. sucrose, 5 per cent. salts, 10 per cent. Crisco and 5 per cent. lard. This diet was supplemented with a vitamin A and D concentrate (4 mg/100 g diet). The level of protein in the diet was about 15 per cent. on the basis that the percentage of protein in FlB was approximately 37 per cent.[9] as contrasted with 45 per cent. protein in brewer's yeast. Six mice on this ration grew satisfactorily over a period of 30 days, and their growth compared favorably with that of animals raised on a highly purified ration containing 18 per cent. casein.

The utilization of FlB as a food constituent seems to be all the more noteworthy, since this and related molds can be easily grown in the course of the alcoholic fermentation of hexoses and pentoses present, for instance, in properly pretreated wood hydrolysates, sulfite waste liquors[10] and wheat stillage.[11]

SUMMARY

It has been shown that *Fusarium lini* B. grown on an artificial stock culture medium when supplemented with thiamin provides adequate amounts of the B-complex vitamins for normal growth, reproduction and lactation in mice, and that it compares very favorably with brewer's yeast in its food value.

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PODOPTERA, A HOMOEOTIC MUTANT OF DROSOPHILA AND THE ORIGIN OF THE INSECT WING

AMONG the mutants of Drosophila the ones of greatest interest to the morphologist, embryologist and evolutionist are the homoeotic (Bateson) mutants involving the replacement of a segmental appendage by a homodynamic one. The best-known cases are: aristopedia (Balkaschina), the transformation of the arista of the antenna into a more or less complete tarsus; proboscipedia (Bridges) in which the labella of the proboscis have changed into tarsi; tetraptera (Chetverikow) with halteres changed more or less into wings; tetraltera (Goldschmidt) with wings changed more or less into halteres. To these we add now a higher allele of tetraltera named podoptera with wings changed more or less into legs. We believe that this mutant is so important to the comparative morphologist that a short note in advance of an illustrated paper is justifiable.

Podoptera has a still lower penetrance than the allelic tetraltera. In homozygous lines the incidence of the type varies from ¼ to 3 per cent., all other flies being normal. Thus far no methods for increasing this penetrance sufficiently so as to allow an embryological study have been found. Another character which podoptera has in common with tetraptera is the extreme asymmetry of expression—only one wing shows the type. Thus far only one per cent. of flies with both wings affected have been found. A third parallelism to both tetraptera and tetraltera is the highly variable expressivity of the mutant effect. This is a very welcome feature, because it results in the appearance of a complete series of transitions from a wing to a leg without tarsus. This is important for the interpretation, as it rules out the possibility of assuming either a translocation of a leg disk dorsally or an erroneous induction of an undetermined disk (the latter is also excluded by the developmental physiology of Diptera), in addition to other explanations of this type. The transformation to be described shortly has shown to my (and probably most entomologists') surprise that Berlese's idea of the quadripartite structure of the wing is essentially correct; and further that the Drosophila wing con-