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-

tains visible parts homologous to a leg consisting of coxa, femur and tibia.

The following stages of transformation are typical, omitting more or less abnormal side lines. (1) The wing is spread at right angles, small irregularities of venation appear; the costal cell changes. (2) The spread wing shortens, part of the veins and of the wing at the posterior end are missing. The costa adjacent to the costal cell becomes thicker and its segmentation into three parts visible in the normal wing is accentuated. The costa thickens and extra bristles appear in addition to the normal two rows. (4) The wing spread is reduced to two lobes, frequently inflated or in the shape of two chitinized knobs with bristles; only the squama (alula) remains more or less as a separate posterior structure, sometimes assuming the shape of a palpus. At this stage the costa and the neighboring cell become separated from the rest of the wing and transform into a typical leg without tarsus, sometimes properly bent between femur and tibia. There is a coxa at the basis, tibial spurs at the end of the tibia and the four rows of bristles on each face typical for a leg. There are many small variations and pathological formations, but this main line of transformation clearly stands out. Sometimes the incomplete transformation shows in an anterio-posterior sequence; (1) the more or less developed leg, (2) two knobs of different size and form and with bristles, (3) a palpus-like structure derived from the squama. The best description of this condition would be to call it a quadripartite parapod with one leg and palpus and two lobes in between. It ought to be added that the halteres are always normal, but that in many individuals femur or tibia in one or two legs show abnormalities.

These facts demand a discussion from the standpoint of comparative morphology. I can not see any way out of the following conclusions (which will be analyzed in detail and with discussion of former views in a forthcoming paper) except by claiming that what looks like a three-jointed leg, in the best cases of about two thirds size of the normal leg without tarsus, is no real leg: The insect wing is a dorsal homolog to a ventral leg, both primarily consisting of coxa, femur and tibia exactly as in Snodgrass's picture of an ancestral leg. As functional dorsal legs are an impossibility the origin of the wings must go back to the dorsal parapodium (notopod) of polychetes. The quadripartite condition of the wing must be derived from a similar condition in a parapod. It is possible that thus the squama parallels an exopodit, while the basal part of the costa remains the leg or endopodit. The general phylogeny of arthropods will have to be revised if our interpretation of the new facts is correct.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SUGGESTED STERILITY TEST FOR PENICILLIN

IN 1943 the authors[1] reported the inactivation of penicillin by cysteine.[2] Lawrence,[3] in 1943, described a sterility test for penicillin which involved the use of an enzyme preparation, Clarase, for the inactivation of the antibiotic. In a later communication[4] he stated that this activity of Clarase was not associated with its diastatic properties, but was due to water-soluble filterable substances of bacterial origin which were present in the enzyme preparation. Stanley[5] reported that only certain samples of Clarase were effective penicillin-inactivators and emphasized the fact that each lot of the material should be tested and standardized in this respect before being employed in the sterility test. Recently, Cavallito and Bailey[6] published a note dealing with the inactivation of penicillin and other antibiotics by cysteine and related compounds. Harper,[7] Ungar[8] and Liebmann, McQuarrie and Perlstein[9] have described penicillinase preparations from different bacteria, and the last-mentioned workers have stressed the need for a penicillin-inactivator which can be sterilized and standardized easily.

In our laboratories, the following compounds have been tested for their ability to interfere with the antibiotic activity of penicillin: cysteine, cystine, glutathione, methionine, taurine, thiosalicylic acid, thiourea, sodium thioglycollate and dithiodiglycol. These compounds were dissolved in NaOH–KH_2PO_4 buffer solution or water, adjusted to a pH of from 7.0 to 7.5 and sterilized by filtration through Swinney or Seitz filters. A concentration of 2 per cent. was employed in each case where the compound was

[1] Report to the Johnson Research Foundation, 1943.
[2] This work was carried out at the Laboratories of General Bacteriology, Yale University, and was aided by a grant from the Johnson Research Foundation of New Brunswick, N. J.
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