one or more peptide bonds, resulting in the formation of the meromyosins containing latent N- and C-terminal residues which can be liberated by depolymerization in 5*M* urea solution. However, this is unlikely, as the operation of the "trigger" mechanism would vary according to the specificity of the protease used, and these details would probably be detected on comparison of the C-terminal residues.

Laki (*11*) concludes "that the meromyosins are the proteolytic split products of myosin and as such should not be considered as pre-existing subunits of myosin." However, he agrees that "since tracer studies show that the two fragments of myosin have different turnover rates [(*18*)], at least two subunits of some kind pre-existing in the muscle can be postulated." I would, therefore, like to draw attention to the work of Marshall and Holtzer (*19*), who used an immunological staining technique with the antibodies of myosin, L- and H-meromyosin. The areas of the sarcomere, stained by the antibodies of L- and H-meromyosin, were more than the length of a myosin molecule apart, suggesting that myosin is either dissociated into L- and H-meromyosin in the muscle fibrils or that the molecule is greatly extended (*20*).

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Specific Action of Adenine as a Feedback Inhibitor of Purine Biosynthesis

Abstract. Purines can prevent the formation of aminoimidazole precursors which are accumulated by bacterial mutants genetically blocked in purine biosynthesis. If the block does not interfere with interconversions among adenine, guanine, hypoxanthine and xanthine, then any of the purines can act as a feedback inhibitor. If conversion of the other purines to adenine is prevented, then adenine becomes a specific requirement for inhibition; this indicates that feedback control operates at a level involving adenine or one of its congeners.

Auxotrophic mutants of bacteria that accumulate the substrates of their blocked reactions have been extremely useful for studying feedback control of biosynthetic processes. The formation of the precursor serves as an index of the potential capacity of the bacteria for *de novo* synthesis of the metabolite in question. In the case of purine biosynthesis, feedback inhibition has been studied at the level of several aminoimidazole intermediates accumulated by purine-requiring mutants. The formation of the ribotides of both 5-aminoimidazole and 5-amino-4-imidazolecarboxamide (AICA) (excreted as their respective ribosides) is prevented by those purines which can support the growth of the mutants (1, 2).

Nonproliferating suspensions of strain B-96/1, a mutant of *Escherichia coli* B, accumulate AICA because of a mutational impairment in transformylase activity. An additional, genetically unrelated, requirement for tryptophan allows the nonproliferating condition to be maintained when growth-promoting purines are added in the absence of tryptophan. Under these conditions, all purines which can serve as growth factors (adenine, hypoxanthine, xanthine, guanine, and isoguanine) cause a direct and immediate cessation of AICA formation (2). Half-maximal inhibition is obtained with as little as 0.02 to 0.04 μmole of any purine per milliliter. Since interconversions between the purines can proceed unhampered beyond the transformylase block in strain B-96/1, it was not known whether each of the various purines exerted a separate inhibition or whether there was only one inhibitory form to which the others could be converted.

In order to resolve this question, a system was required which contained an early block to allow for accumulation of precursors as well as an additional late block beyond the pivotal position of inosinic acid to prevent interconversions of the exogenously supplied purines. In addition, an unrelated deficiency in amino acid formation would be desirable to permit analysis under nonproliferating conditions. The chance isolation of strain B-94, another mutant of *Escherichia coli* B, provided these requirements. This mutant is lacking in adenylosuccinase, a bifunctional deacylase which is required for two separate functions in the biosynthesis of adenylic acid (*3*). One reaction involves the desuccinylation of SAICAR (*4*), the succinyl derivative of AICA-ribotide; the other involves a similar splitting of adenylosuccinic acid to yield adenylic acid. Consequently, loss of this enzyme results in (i) the accumulation of SAICAR (excreted as both riboside and ribotide in the proportion 85:15) and (ii) a block in the process by which inosinic acid is aminated to adenylic acid so that interconversions which lead to adenylic acid are prevented and a specific requirement for adenine is manifested. Strain B-94 also exhibits a growth requirement for arginine which is unrelated and genetically distinct from the adenylosuccinase deficiency.

Table 1. Comparison of the inhibitory action of purines on the formation of AICAR by strain B-96/1 and on SAICAR by strain B-94.

Purine	Amount required for 50% inhibition (μmole/ml)	
	AICAR (B-96/1)	SAICAR (B-94)
Adenine	0.02	0.03
Hypoxanthine	0.02	0.24
Guanine	0.04	7.20
Xanthine	0.03	> 10.00

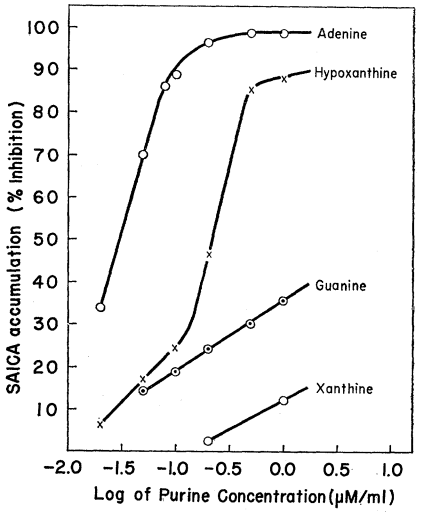

Fig. 1. Dose-response curves of the inhibitory action of various purines on the formation of SAICAR by strain B-94. The yield of SAICAR was determined after an incubation period of 2 hours at 37°C.

Accumulation of SAICAR and AICAR by nonproliferating suspensions of strains B-94 and B-96/1, respectively, was examined by methods previously described (*5*). Glucose and ammonium chloride served as the sources of carbon and nitrogen. The accumulated compounds were measured as diazotizable amines with special modifications (*3*) to distinguish between SAICA and AICA. In Table 1, the amounts of the purines required for a 50-percent inhibition of SAICAR formation in strain B-94 are compared with the amounts required for similar inhibition of AICAR formation in strain B-96/1. In the latter case, where interconversions are not impaired, there is no more than a twofold difference between any of the purines, but in strain B-94, where interconversions are restricted, only adenine, the specific growth factor for this strain, shows a comparable degree of inhibition. As can be seen in Fig. 1, hypoxanthine has only 0.1 the activity of adenine; guanine and xanthine are comparatively inactive. The inhibition obtained with higher concentrations of hypoxanthine could be due to a weak feedback action, or, more probably, to an indirect effect whereby available substrates are diverted from their *de novo* purpose. For example, in the conversion of hypoxanthine to adenylosuccinic acid, a process known to operate in strain B-94, two substrates must be used which are also required for the *de novo* formation of SAICAR; these are 5-phosphoribosyl-1-pyrophosphate (PRPP) and aspartic acid. Xanthine and guanine would effect only a diversion of PRPP, and hence even higher concentrations would be required for inhibition. Thus, two mechanisms may be operating—one, an indirect effect inherent in the artificiality of the system whereby exogenously proffered compounds may compete for substrates; the other, a direct feedback action, operative in vivo and specifically triggered by very small concentrations of adenine or one of its ribosylated congeners (*6*).

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Dispersal of Fresh-Water Algae by Migratory Water Birds

Abstract. Many migratory water birds killed in Texas and Oklahoma contained viable fresh-water algae in the lower digestive tracts. Such birds are thought to play a significant role in the long-range dispersal of certain algae, particularly those species easily killed by desiccation.

Many fresh-water algae are distributed widely over entire continents, if not the world. How such forms are transported from one body of water to another is not well known, but the usual explanation has been that they are carried either by wind or on the feet, feathers, and bills of birds (*1*). As previously noted (*2*), neither method would be very effective in dispersing algae easily killed by desiccation, for example, the desmids. Such algae might be transported considerable distances without being subjected to desiccation if they could survive a passage through the alimentary canal of migratory birds (*3*). The observations reported here indicate that many fresh-water forms are able to do so.

Over a period of approximately one year, 25 different migratory waterfowl (126 birds) were shot from playas and fish-hatchery ponds in western Texas and south-central Oklahoma. Thirteen were discarded because of empty or shot-perforated large intestines. The birds were placed on ice as soon as they were killed, and later examined, usually within 1 to 3 hours. At that time one inch of gut from between the junction of the caecum and the cloaca was ligated and removed. Also an occasional sample was taken from the distal portion of one of the caeca. After the section of the intestine had been dipped in 70-percent ethyl alcohol to remove possible contaminants, one end was removed with sterile scissors, and the fecal contents were allowed to drop into a sterile flask of distilled water. A few minutes later 5 ml of this suspension was pipetted to a second flask containing autoclaved soil-water medium. This procedure was followed for each bird, yielding two sets of flasks. Both sets of flasks were then placed in a culture cabinet at 23°C under continuous artificial light for a period of 3 to 10 days. At the end of that time the contents were examined microscopically for living algae.

Viable algal cells were present in the lower digestive tract or caecum of one or more of the birds from each of the 25 genera examined. Viable algae were present in birds killed over both land and water. From such piscivorous genera as grebes, herons, kingfishers, and egrets only a few simple unicellular green algae of the "Chlorella type" and an occasional blue-green alga were obtained. A much greater variety of algae was found in ducks and bottom-feeding

Table 1. A comparison of the number and kinds of viable fresh-water algae recovered from the lower digestive tracts of some migratory water birds.

Bird	No. of birds examined	No. of algal genera present	Representative genera of algae*
Pied-bill grebe (*Podilymbus podiceps*)	9	2	
Green-winged teal (*Anas carolinensis*)	14	17	4, 5, 6, 7, 10, 11, 13, 14
Blue-winged teal (*Anas discors*)	5	14	3, 4, 5, 6, 10, 13
Shoveler (*Spatula clypeata*)	6	20	1, 2, 4, 5, 6, 8, 10, 13, 15
American coot (*Fulica americana*)	7	28	2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15
Killdeer (*Charadrius vociferus*)	20	20	4, 5, 6, 7, 9, 10, 11, 13, 14, 15
Dowitcher (*Limnodromus griseus*)	9	20	1, 2, 3, 4, 5, 6, 7, 10, 13, 14, 15
American avocet (*Recurvirostra americana*)	4	15	1, 5, 6, 10, 12, 13, 15
Wilson's phalarope (*Steganopus tricolor*)	2	11	5, 6, 8, 9, 10, 13
Belted kingfisher (*Megaceryle alcyon*)	2	1	

* Key: 1, *Gonium*; 2, *Pandorina*; 3, *Eudorina*; 4, *Oedogonium*; 5, *Pediastrum*; 6, *Scenedesmus*; 7, *Spirogyra*; 8, *Closterium*; 9, *Penium*; 10, *Cosmarium*; 11, *Staurastrum*; 12, *Phacus*; 13, Naviculoid diatoms; 14, *Merismopedia*; 15, *Arthrospira*.