crimination of species include the number of diaphragms, breadth of the cortical region, thickness of the zooecial walls, and the angle at which the zooecia reach the surface. These measurements are found to vary so widely within one colony that as many as three "species" can be designated from one end to the other.

The axial ratio (ratio of the diameter of the axial region to the diameter of the branch) was considered constant for any one species by G. W. Lee [*Mem. Geol. Survey G. Brit.* 1 (3), 135–195 (1912)] and subsequent workers. According to Lee, the proximal ends of the cortex were absorbed as the distal ends were extended. The rate of absorption was assumed to be balanced with the rate of growth, so that the axial ratio remained constant. The axial ratios in different parts of single colonies of the Hamilton group, however, show more variation than Lee allowed within species. On this basis also, as many as three "species" can be differentiated within a colony.

The present investigations resulted in an alternate hypothesis of the mode of growth of ramose colonies that is more consistent with axial ratio measurements and other observations. This new interpretation assumes resorption of the growing tips at the distal ends of the thick-walled regions. The cycle presumably began with growth of the zooecia in the thin-walled region so as to extend the growing tips of the colony. A thick-walled zone was then formed around the tips. Next, resorption from the outer ends of the zooecia back toward the base of the thick-walled region removed distal portions of walls and associated structures such as diaphragms. The amount of resorption varied greatly among species, but usually some traces of the thick-walled region remained. Another cycle began with the extension of the thin-walled region. This growth, in the distal ends of the colony, lengthened the branches.

Proximal to the growing tips of the colony, where the zooecia established their thick-walled regions in permanent positions opening along the sides of the branches, there are no signs of resorption. Zooecial growth was restricted to the cortex. Thickness of walls, number of diaphragms, and other intramural structures increase progressively toward the base of the colony. The thin-walled, axial region was not affected. Thus, changes in the axial ratio result from a slow proximal increase in the breadth of the cortex, with resulting increase in the diameter of the colony and no accompanying changes in the axial region.

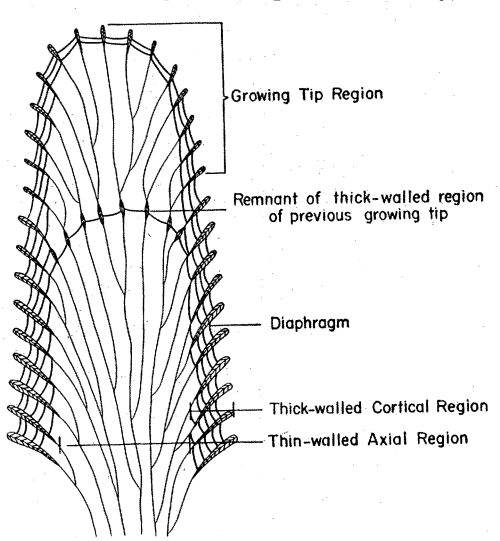

Fig. 1. Idealized diagram of a ramose bryozoan in axial view.

A study of complete colonies indicates that a wider range of specific variation must be allowed in the structures that are controlled largely by the stage of development of the colonies.

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Chromosomes of *Hypomyces solani* f. *cucurbitae*

The cytology of *Hypomyces solani* f. *cucurbitae* was first investigated by Hirsch (*1, 2*). On the basis of her investigations she concluded that the haploid chromosome number is four in the hermaphroditic strain, three in the male, three in the female, and two in the neuter. When the hermaphrodite mutates to male, it loses one of its sex chromosomes; when it mutates to female it loses the other. Hirsch claimed that hermaphrodites and neuters, which are produced among the offspring of the cross ♀ × ♂ (*3*), arise as a result of occasional nondisjunction of sex chromosomes.

However, my genetic investigations (*4*) were not in accord with Hirsch's interpretations, and hence the cytology of *Hypomyces solani* f. *cucurbitae* required reinvestigation. It is the purpose of this paper to describe briefly the results of such reinvestigation (*5*).

By employing the aceto-orcein smear technique, which was used successfully by McClintock (*6*) on *Neurospora crassa*, it was possible to study the nuclear behavior in the ascus and to determine the number of chromosomes in each of the four strains. Priority was given to the cross ♀ × ♂, since the four sex strains can be obtained from such a mating, and hence the chromosome number in each strain would be determined. Careful analysis of diakinesis, prometaphase I, and metaphase I figures has revealed that the number of bivalents at these stages was consistently four. At early anaphase I and mid-anaphase I, eight dyads could be counted. During the following divisions each nucleus was observed to contain four chromosomes. Nondisjunction of what are called the two sex chromosomes, as reported by Hirsch to occur frequently during the first anaphase, has never been seen. Since, from the cross ♀ × ♂, the four sex strains are produced, and since all nuclei in the ascus at the same stage of division have the same number of chromosomes, it seems justifiable to conclude that the haploid chromosome number in hermaphrodite, female, male,

and neuter is four. Asci derived from the cross ♀ × ♀ were also studied cytologically, and the pairing behavior and chromosome number were found to be the same. A detailed report of these findings will be presented subsequently.

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Instability of Compounds in the Folic Acid Series

There is currently a quickening of interest in studies that involve compounds in the folic acid series, particularly with regard to their effect in biological systems concerned with single-carbon transfer (*1–3*). The chemical manipulation of these compounds may result in their partial decomposition, especially under conditions where wide changes in *p*H are encountered and where the compounds are subjected to the vicissitudes of paper chromatography.

Exposure to air causes rapid oxidation of some of the folic acid compounds. Photolytic breakdown occurs when these compounds are exposed to light; this has been studied in some detail in the case of pteroylglutamic acid, but precise information is lacking with respect to other compounds in the series. Acid and alkaline conditions departing from the isoelectric point or the *p*H of formation of the compound cause various types of transformation. The citrovorum factor is rapidly converted by acid into imidazoline compounds (anhydroleucovorin-A and -B and isoleucovorin chloride), which may undergo further decomposition (*4*). These imidazoline compounds are interconvertible under various conditions of acidity and revert to leucovorin upon anaerobic treatment with alkali, while a similar aerobic treatment converts them to pteroylglutamic acid. The lability of aminopterin should be noted. This compound is readily deaminated by acid or alkali to form pteroylglutamic acid, with consequently an abrupt change in biological properties. The content of pteroylglutamic acid in aminopterin, which has been noted by various investigators (*5–7*), may be greatly augmented by inappropriate experimental manipulation. Similar comments apply to 4-amino-10-methylpteroylglutamic acid.

In planning experiments with the folic acid series of compounds, it may be well to refer to the original literature for a description of their properties. A qualitative summary of these properties together with references for additional use appears in Table 1.

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Table 1. Some properties of the folic acid compounds.

Substance	Destruction caused by				References
	Light	Atmospheric oxygen	Low *p*H	High *p*H	
Pteroylglutamic acid (PGA)	+	±	+	±	(*8*) (*9*)
Tetrahydro-PGA		+++			(*10*) (*11*)
10-formyl-PGA				++	(*11*) (*12*)
10-formyl-tetrahydro PGA		+++		+++	(*4*) (*11*)
5-formyl-tetrahydro PGA (leucovorin)		–	+++	–	(*4*) (*11*) (*12*) (*13*)
Anhydroleucovorin-A		–	+	+++	(*4*)
Anhydroleucovorin-B			+	+++	(*4*)
Isoleucovorin chloride		–	–	+++	(*4*)
4-amino-PGA (aminopterin)	+	±	+	++	(*14*) (*15*)