Although the primates and the guinea pig are the only warm-blooded creatures (so far as is known) which cannot synthesize their own requirements of ascorbic acid, it is probable that in many other animals and birds the diet contributes to the ascorbic acid found in the body tissues.

Ascorbic acid is an indispensable hydrogen carrier in the metabolism of animals. It is known that the metabolism of mature birds of different species varies more nearly with the 0.66 power of body weight than the 0.73 power as appears to be the case with mammals⁷. It seems probable that the higher plasma ascorbic acid level of birds is related to the higher metabolism of avian tissues compared with those of mammals.

E. H. Hipsley, medical officer-in-charge of the Australian Institute of Anatomy, Canberra, gave advice and assistance with this study.

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Symbiosis and Phylogenesis in the Isoptera

SOME years ago—in 1924—I discovered bacteriocytes in the fat tissue of an Australian termite, *Mastotermes darwiniensis*, and I fully realized the phylogenetic significance of this discovery. My interpretation was confirmed by the researches of Kock, a pupil of Buchner.

I asserted, quite emphatically, that *Mastotermes* alone among termites demonstrate the bacterial symbiosis which every cockroach presents. I had not found bacteriocytes in *Reticulitermes lucifugus* (Rhinoitermitidae), *Calotermes flavicollis* (Kalotermitidae), or *Termopsis* (Hodotermitidae); but I had no opportunity of studying *Archotermopsis*, and I could only assume the absence of bacteriocytes from the fact that Imms, studying *A. wroughtoni*, observed nothing of the kind.

I am now able to state that, from a recent examination of specimens of *A. wroughtoni*, some of which have kindly been given me by Emerson (Chicago), that this archaic species of termite has neither bacteriocytes like *Mastotermes* nor any feature—for example, bacteria scattered through the fat tissue—that could represent rudiments of an ancient symbiosis.

Considering all the evidence, I feel that the order Isoptera should be divided into two suborders: Mastotermitidae and Termitidae, the first with one family, one genus and one living species only.

The primitive characters of *M. darwiniensis* prove the archaicism of the suborder; such specialized characters as it has—like the complications of nest-building capacities and of social life—show the extent of its evolution since the Eocene (at least).

Perhaps further study of the hypermastigin symbionts would give other evidence to show whether Mastotermitidae should be separated from all the other Isoptera or not.

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New Vectors of Strawberry Viruses

FRAZIER¹ has reported recently that certain strawberry viruses in California are transmissible by five species of aphids in addition to the long-established vector, and common strawberry aphid, *Pentatrichopus (Capitophorus) fragæfolii* (Ckll.)². In Britain only *P. fragæfolii* and the closely related *P. tetraodon* Walk. were shown³ to transmit crinkle, and only the former is known to transmit yellow-edge⁴.

Experiments at East Malling showed, in 1950, that the aphids *Myzus ascalonicus* Doncaster and *Acyrtosiphon malvae* subsp. *rogersii* (Theob.) could transmit two components of the strawberry virus complex, and this was confirmed in 1951. *Aulacorthum solani* (Kltb.) failed to transmit any of the viruses. The relevant details of some of the tests are given in the accompanying table.

The aphids were allowed long feeding periods of several days on plants infected with both mild crinkle (short persistence), crinkle and yellow-edge (long persistence) viruses. Long test-feeding periods on *F. vesca* plants were also used, so that the aphids would have conditions known to be suitable for a high rate of virus transmission by *P. fragæfolii*⁵. The

RESULTS OF SOME TESTS WITH STRAWBERRY VIRUSES AND SPECIES OF APHID

Aphid species*	Virus source	Infection feed (days)	Test feed (days)	Aphids per plant	Test plants	
					Infected	Symptoms
<i>Acyrtosiphon malvae</i> subsp. <i>rogersii</i>	yellow-edge and crinkle	4	7	5	1/5	vein-clearing, crinkle, vein-clearing
		10	9	10	5/10	crinkle
	crinkle	9	10	10	2/5	crinkle
		2	7	10	1/5	crinkle
	mild crinkle	2	3	10	2/2	vein-clearing
<i>Aulacorthum solani</i>	crinkle	10	10	20	1/3	mild crinkle
	vein-clearing	5	1	10	1/3	vein-clearing
	yellow-edge and crinkle	2	5	10	0/5	—
		3	7	10	0/8	—
		4	6	50	0/3	—
<i>Myzus ascalonicus</i>	yellow-edge and crinkle	3	4	10	1/5	vein-clearing
		4	1	10	0/5	—
	vein-clearing	2	1	5	1/10	vein-clearing
		5	8	10	3/8	vein-clearing
	crinkle	5	8	10	0/5	—
		2	8	10	1/5	crinkle

* Provided and determined by Dr. G. H. L. Dicker.