Technique. A piece of liver was removed within a few hours after death, placed in cold storage overnight, and on the following day 5 gm. was weighed out in duplicate, minced with scissors, 15 c.c. of 5 per cent caustic potash added, and kept in cold store if not being dealt with immediately.

The vitamin was extracted according to the method of Davies[6]. The unsaponifiable portion was dissolved in 10 c.c. of chloroform, and the blue units determined by the use of a Lovibond tintometer. In the large majority of cases, an amount of the chloroform solution was taken such as would give a reading of blue units between 3 and 6, but readings slightly beyond this range were used as the basis for calculating the results in a minority of cases.

Results. Great variation in the liver reserve of dogs has been found to occur. Whether this is associated with the amount of vitamin available in the food, or with the ability to absorb and store it in the liver, is not here indicated. The average of these reserves was found to be 678 B.U./gm., but, as pointed out by Moore[7], the average figure may be misleading owing to the wide variations, and the medial figure is a more reliable one to take as an indication of a standard. The medial figure in our series (taking an average of the six central figures) is 153·5 B.U./gm.

The exact age of these dogs was not known. Six which were only a few months old gave values 9, 10, 36, 47, 62 and 70 respectively. At the other extreme of life, greater variation in the vitamin store appeared to occur. In seven old dogs the values were 26, 36, 103, 171, 206, 340, 1125.

In twenty-three lean or poor-conditioned dogs, the average vitamin A content was 415·8 B.U./gm., with a range of from 11 to 2800, and in three very fat dogs the figures were 8, 171, 447. From these limited data there does not appear to be an association between the vitamin A reserve and the body condition in the dog.

Moore[7] showed that in the rat a condition of extreme emaciation did not necessarily lead to a diminution of the vitamin A reserves of the liver, and one of us (R. G. L.) found large reserves in the livers of hens and geese that had been starved to death by their owner.

R. G. LINTON.
A. BROWNLEE.

Royal (Dick) Veterinary College,
Edinburgh.

[1] Holmes, A. D., Tripp, F., and Satterfield, G. H., *Amer. J. Physiol.*, **123**, 693 (1938).
[2] Bradfield, D., and Smith, M. C., *Amer. J. Physiol.*, **124**, 168 (1938).
[3] Chevalier, A., and Choron, Y., *C.R. Soc. Biol.*, **120**, 1223 (1935).
[4] Simmonet, H., Busson, A., and Asselin, L., *C.R. Soc. Biol.*, **109**, 358 (1932).
[5] Busson, A., and Simmonet, H., *C.R. Soc. Biol.*, **109**, 1253 (1932).
[6] Davies, A. W., *Biochem. J.*, **27**, 1770 (1933).
[7] Moore, T., *Lancet*, ii, 669 (Sept. 24, 1932).

Monogenic Broods in *Armadillidium vulgare* Latr.

VANDEL[1] has found that in the woodlouse, *Trichoniscus provisorius*, there occur both amphogenic broods (broods containing approximately equal numbers of both sexes) and monogenic broods (broods consisting of one sex only or very nearly so). He accounts for the occurrence of arrhenogenic broods (broods consisting of males only) and thelygenic broods (broods containing only females) by suggesting that in woodlice the female is the heterozygous sex (chromosomes XY) and that the segregation of the sex chromosomes in monogenic females is controlled by the cytoplasm. Thus in arrhenogenic females every egg receives an X chromosome and the Y chromosome always passes into the first polar body. Such a female, therefore, produces broods containing only males.

One of the main arguments for accounting for monogenic broods in this way is that the male has no effect on the type of brood produced. Vandel's evidence for the male having no effect on the type of brood produced is that in several cases all the females of any one brood mated with either 'ordinary' males (from amphogenic broods) or with 'exclusive' males (from arrhenogenic broods) produced either all arrhenogenic or all thelygenic broods. Sister females thus resembled each other in producing the same type of monogenic brood no matter what type of male they were mated with.

Amphogenic and monogenic broods have also been found in the woodlouse *Armadillidium vulgare* Latr. by Howard[2] and Vandel[3]. By mating males of *Armadillidium* to two or more females I have also been able to show that the male has probably no effect on the type of brood produced. The same male mated to two different females may produce both arrhenogenic and thelygenic broods or both amphogenic and monogenic broods. The data are given in the table.

Parents of brood		Constitution of brood	
Male	Female	Males	Females
B	*A*	1	36
B	*AB*	22	9
AM	*AB*	34	8
AM	*AJ*	6	50
AL	*CB*	1	37
AL	*CC*	0	25
AL	*CD*	64	0
AN	*BK*	45	0
AN	*U*	0	56
SB	*DA*	0	30
SB	*EA*	46	47

It seems, therefore, very probable that it is the female which determines the type of brood produced. It has also been possible by using different genetical types to show that neither arrhenogenic nor thelygenic broods are due to parthenogenesis.

The above data also have another interest. The three females, *CB*, *CC*, and *CD*, are all from the same brood. One brood may, therefore, contain both arrhenogenic and thelygenic daughters. Also female *BK*, parent of an arrhenogenic brood, was a daughter of a thelygenic female (female *A* in the table). Such facts will have to be considered in suggesting schemes for the inheritance of arrhenogeny and thelygeny. It seems possible that while the male has no effect on the sex ratio in a brood, he does have an effect in determining the types of females produced.

H. W. HOWARD.

School of Agriculture,
Cambridge.
Nov. 15.

[1] Vandel, A., *Bull. Biol. France et Belg.*, 72, 147–86 (1938).
[2] Howard, H. W., NATURE, **142**, 1038 (1938).
[3] Vandel, A., *C.R.*, **203**, 1050–52 (1939).