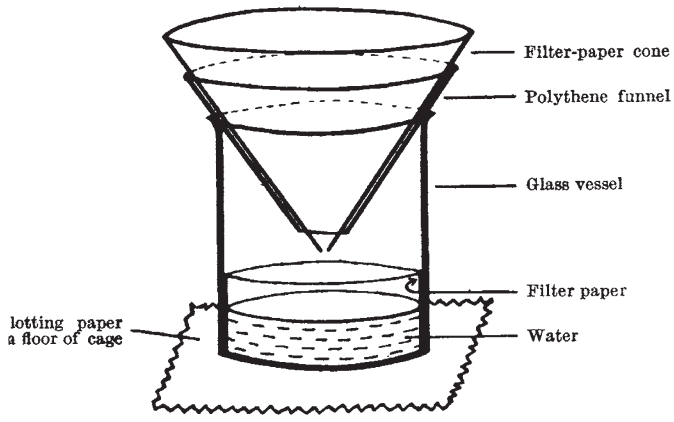

Fig. 1. Method of trapping into water eggs laid on a dry surface

of the continuity of endemic malaria in the savanna regions of Africa.

I thank Prof. V. B. Wigglesworth for his advice.

L. K. H. Goma

E.A. Virus Research Institute,
P.O. Box 49,
Entebbe,
Uganda.

[1] Horsfall, W. R., *Mosquitoes*, 27 (Constable, 1955).
[2] Wesenberg-Lund, C., *Mem. Acad. Roy. Sci. and Lettres*, **7**, 75 (1921).
[3] Detinova, T. S., *World Health Org. Monogr.* No. 47, 57 (1962).
[4] Marshall, J. F., *The British Mosquitoes*, 32 (Brit. Mus. (Nat. Hist.), London, 1938).
[5] Holstein, M. H., *World Health Org. Monogr.* No. 9 (1954).

Parthenogenesis in the Cattle Tick, *Boophilus microplus*

Although bisexual reproduction is usual among ticks, there have been reports of parthenogenesis in various species including *Amblyomma agamum*[1], *Rhipicephalus bursa*[2], *A. dissimile*[3], *Hyalomma anatolicum*[4], *Ornithodorus moubata*[5], and *Haemaphysalis bispinosa*[6]; but there appears to be no previous record of parthenogenesis in *Boophilus microplus*. In fact, it was considered by many workers on the cattle tick in Australia that *B. microplus* females were unable to complete engorgement in the absence of males, and it was reported[7] that female cattle ticks isolated from males in small areas on a sheep by means of repellent barriers did not engorge completely. Furthermore, Riek[8] observed that unfertilized female cattle ticks remained attached to mice for considerable periods without engorging. In both instances the subsequent introduction of males led to rapid engorgement of the females.

It has now been shown that in the Yeerongpilly (Queensland) strain of *B. microplus*, 62 per cent of 185 females, freshly moulted from individually tubed, replete nymphs, engorged and detached from a steer in the complete absence of males. Fifty-five per cent of these unmated engorged females produced some viable eggs, the hatch of individual egg masses ranging from 0·1 to 48 per cent (mean of 2·2 per cent) when stored at 80° F and 80–90 per cent relative humidity. By comparison, it is usual under these conditions of temperature and humidity for more than 95 per cent of engorged females detaching from artificially infested cattle to lay large numbers of viable eggs, most egg masses having a high percentage hatch (Hitchcock[9] recorded a hatch of 84 per cent at 79° F and 85 per cent relative humidity). In another experiment, unmated females took significantly longer to engorge, and the mean engorged weight was significantly less than for mated females raised on the same steer. Unfertilized eggs had a longer minimum developmental period than fertilized eggs.

Various malformations appeared in parthenogenetic embryos and larvæ, but 2 per cent of parthenogenetic larvæ attached to a steer and reached maturity. All the adults detected, after careful searching of the 1-in.-diam. areas of skin exposed to ticks under the confining box, were female, suggesting a form of thelytoky. Seventy per cent of these fatherless females engorged to medium size or larger, 45 per cent gave eggs and 22 per cent produced progeny. Thus, about 0·25 per cent of first generation parthenogenetic larvæ were capable of reaching maturity and then of giving rise to a second generation without males. Only 2 second-generation fatherless females were obtained (no males), but one of these gave rise to third-generation parthenogenetic larvæ.

It is unlikely that a parthenogenetic laboratory strain of *B. microplus* will be established from this stock. However, the other exotic cattle tick in Australia (*H. bispinosa*) has been shown by Bremner[6] to reproduce by obligate parthenogenesis in one Queensland strain, males being rare and nonfunctional, although in Japan[10] a strictly bisexual race as well as a parthenogenetic race of this latter species is known to exist.

It is not certain whether this phenomenon demonstrated for *B. microplus* can be regarded as true facultative parthenogenesis or whether it is accidental parthenogenesis which, according to Bergerard[11], does not establish itself in Nature. Further work is also required to disclose the type of cytological mechanism involved, to see whether parthenogenesis occurs in other strains of the cattle tick and to determine if it has any significance so far as control and eradication programmes are concerned.

B. F. Stone

C.S.I.R.O.,
Division of Entomology,
Yeerongpilly,
Queensland.

[1] Aragão, H. de B., *Mem. Inst. Osw. Cruz.*, **4**, 96 (1912).
[2] Nuttall, G. H. F., *Parasitol.*, **6**, 139 (1913).
[3] Bodkin, G. E., *Parasitol.*, **11**, 10 (1918).
[4] Pervomaiskii, G. S., *Zool. Zh.*, **28**, 523 (1949).
[5] Davis, G. E., *J. Parasitol.*, **37**, 99 (1951).
[6] Bremner, K. C., *Austral. J. Zool.*, **7**, 7 (1959).
[7] C.S.I.R.O., *Sixth Ann. Rep.* (1954).
[8] Riek, R. F., *Austral. J. Agric. Res.*, **10**, 614 (1959).
[9] Hitchcock, L. F., *Austral. J. Zool.*, **3**, 295 (1955).
[10] Kitaoka, S., *Nat. Inst. Anim. Health Quart.*, **1**, 142 (1961).
[11] Bergerard, J., *Endeavour*, **21**, 137 (1962).

A Non-colonizing Aphid Vector of Potato Virus Diseases

It is now well established that migrating aphids alight in, and feed on, crops which they are unable to colonize[1], and Broadbent[2] has pointed out that such aphids may be responsible for the spread of virus diseases within those crops. An aphid which appears to fill this role in the case of two potato stylet-borne viruses, potato virus *Y* (PVY) and potato virus *A* (PVA), in certain districts of Northern Ireland, is *Brachycaudus helichrysi* (Kltb), the leaf-curling plum aphid.

The possibility that *B. helichrysi* might be responsible for the spread of these two diseases which occasionally occurs in Northern Ireland[3,4] was first considered in June 1961; at that time winged forms of the aphid were found feeding on about 40 per cent of the potato plants (3–6 in. high) in a field located near the site of an earlier outbreak of PVY.

In a small preliminary experiment to test the vector ability of the aphid, winged migrants, taken from infested