**SUPPLEMENTARY MATERIAL**

The purpose of the supplementary material is to expand on the information presented in condensed form the in journal printed material (see especially Figure 2). In twelve sampling trips, a total of 444 animals were collected, of which 155 were females, 157 males and 132 immature (i.e. were smaller than 10 cm and had no gametes in their coelom). The numbers of males and females did not significantly depart from a 1:1 ratio (χ2 = 0.013, df = 1, P<0.05).

This material presents in more detail the pooled coelomic oocyte diameter frequency distributions for females collected during the observed gametogenic cycle. This data underpins our interpretation of the dynamics of the ovarian cell renewal system and the seasonal progression of maturation and its interpretation in relation to the putative life history.

**Seasonal variation in oocyte diameters for the *M.* sanguinea population at Mount Edgecombe, Plymouth, for the period between October 1999 and September 2000.**

Each individual histogram in the series of Supplementary Figures presents pooled oocyte diameters of the eggs measured from several females expressed as a percentage frequency distribution, the shape of which permits an interpretation of the dynamics of ovulation and oocyte growth. A total of 143 females were sampled and more than 12,000 oocytes were individually measured. The smallest coelomic oocyte recorded was 29.9 μm and the largest 243.0 μm. However, it is very likely that the smallest oocyte might have been accidentally detached from the ovaries during coelomic fluid extraction and had not naturally shed into the coelom. Therefore, a minimum diameter of 35-40 μm represents a more realistic value. In each of the following illustrations, the data of collection and the number of females contributing to the pooled frequency distribution is given. Where there was substantial variation between individual females, additional notes are provided,

1. **Initiation of the gametogenic cycle : October to January**

The first sample was obtained on 25th October 1999. The coelomic contents of the eight females collected revealed a single cohort of coelomic oocytes, with a modal diameter of about 75 µm. In the following samples, it became apparent that while the first oocytes to be released into the coelom continued to grow, further ovulation occurred and the frequency distributions became polymodal.

Subsequent samples continued to display this bimodality, indicating that oocyte proliferation was continuing, while the first oocytes to be released continued to grow. The bimodality in the pooled oocyte frequency distributions was typical of individual females, and was not the result of pooling of samples from very disparate samples (data for individual females were available but are not presented here).



By February the larger oocyte class was predominating, suggesting that many of the oocytes were accumulating but at a size threshold below the ultimate maximum size observed at maturity. This is, for instance, apparent in the data obtained from the worms collected on 21st February 2000, when the upper mode was 180µm and only very occasional oocytes were observed with a diameter greater than 200µm.



This situation continued to be observed, but by April, the larger oocyte class was beginning to predominate, although the maximum oocyte diameter observed was still below the apparent 200µm threshold. Essentially, the same situation was observed in May 2000.





The situation found in the samples obtained in June 2000, was rather more complex, as a small number of specimens of small body size (less than 10 cm relaxed length) were collected. These were found to contain only smaller oocytes and were at only the beginning of the oogenic cycle, containing only newly ovulated coelomic oocytes. Consequently the pooled oocyte frequency distributions appear bimodal, but this was entirely due to the presence of a few smaller worms in the sample. The mean and standard deviation of these two cohorts within the pooled distributions were accordingly calculated separately and are presented in Figure 2 in the main text.

The fate of these smaller worms and the oocytes they contained is difficult to determine. It is possible that they developed and grew rapidly and merged with the main population during the next 3 months, thus completing the gametogenic cycle in only 3 to 4 months, or that they would have failed to be mature by the main breeding season, and hence would have contributed to breeding in the following year. No such animals were found in the samples collected in July and August, but this is likely an artefact of the deliberately small number of specimens collected to minimise any incidental environmental damage.





A dramatic change had taken place by July 2000. The pooled oocyte frequency distribution now consisted of a very dominant class of large oocytes, in which, for the first time, contained a majority of oocytes greater in diameter than the previous upper size limit, the modal diameter of the pooled samples being now 210-215µm. Additionally by this time, very few small oocytes were present, these were not due to the inclusion of smaller worms in the pooled samples, as in the June sample. Most likely these very small oocytes were detached from the ovaries by the sampling procedure , as distinct ovaries were still present.

Two samples were taken during August as spawning appeared to be imminent. The population was characterised by uniformly gravid animals whose sex, male or female, could easily be determined simply from the appearance of the animals, whose abundant gametes could be seen through the body wall.



The diameter of the oocytes in the sample of gravid animals obtained on 31st August 2000 was tightly centred around a measured diameter of 215µm, which we take to be the mature oocyte diameter.

One month later spawning had occurred in all the females collected as they were either devoid of coelomic oocytes, or, had begun to accumulate a new cohort of coelomic oocytes. Since an entire gametogenic cycle had now been observed, the regular sampling program was terminated.

The exact time of breeding cannot be pinpointed more accurately than the sampling programme allows; the completion of spawning occurred sometime between August 31st and September 29th but may have begun earlier in some individuals. The diameter of the fully grown oocytes at the time of maturation is taken to be 215 µm for the purposes of deducing the possible mode of development.

Some males and females were observed to spawn in the laboratory at Newcastle, and fertilisations were attempted, using gametes from apparently mature males and females, but without success. The chromosome staining (Figure 1) revealed that the oocytes remained at meiotic metaphase I, and it is likely that some chemical trigger, be it hormone or pheromone or an environmental input is required prior to the final maturation of the oocytes and before fertilisation is possible. We do not believe that this population of *M. sanguinea* is suitable for experimental investigations into what these might be.