The unseen majority:

population dynamics of some non-insect pond invertebrates

R. Céréghino

cereghin@cict.fr - EcoLab, UMR 5245, Université Paul Sabatier, Toulouse, France.

Rationale

The unseen majority usually refers to the microbial world. However, metazoans, for instance pond invertebrates, also have their unseen organisms. We refer here to those species which are not considered by conservationists and managers, because they have low conservation priority and/or do not belong to emblematic taxa. Nevertheless, these organims play a major role in the functioning of pond ecosystems, simply because their numbers and biomass make them dominant players of biological interactions.

Aims

We studied the dynamics of non-insect invertebrates in 3 permanent ponds (fully described in Angelibert et al. 2004. Aquat. Conserv. 14, 439-456.). These 3 neighbouring ponds showed a gradient of vegetation cover and type (sparse bryophytes on rocky substrata (pond 1), extensive submerged *Chara* beds (pond 2), aerial *Typha* stands (pond 3)). We provide detailed information on the life history patterns of 4 representative species.

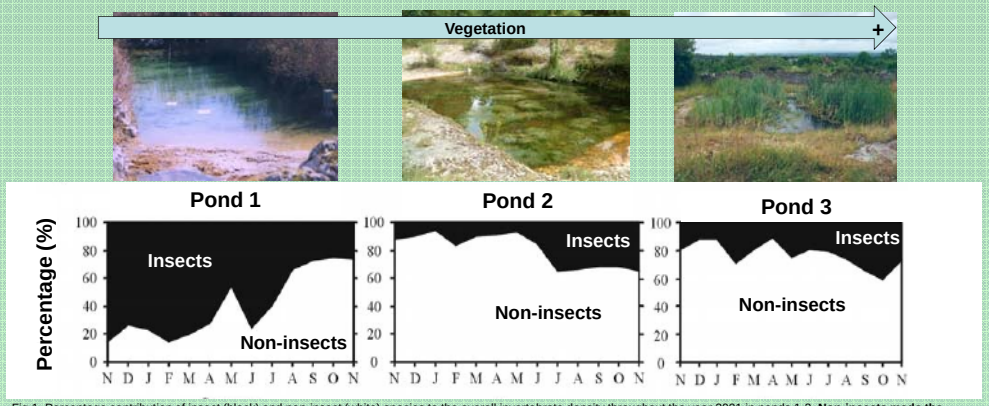

Fig 1. Percentage contribution of insect (black) and non-insect (white) species to the overall invertebrate density throughout the year 2001 in ponds 1-3. **Non-insects made the greater contribution to monthly changes in heavily vegetated ponds** (2 and 3)

➢Many models used to predict the consequences of conservation strategies require life history data. While great emphasis has been laid on insects, little is known about the life histories of invertebrates such as annelids, gastropods or cnidarians. However, these species can disproportionately contribute to pond communities in quantitative terms, when compared to dragonflies or beetles.

➢In ponds with submerged and/or aerial vegetation (*Chara*, *Typha*), non-insects are numerically dominant throughout the year. The corresponding species belong to the Cnidaria, Oligochaeta, Hirudinae, Gastropoda and Hydracarina.

Unlike most insect species, which have fast-seasonal cycles (Cayrou & Cereghino 2005, Aquat. Conserv. 15), **non-insect species occur in ponds throughout the year**
Some typical life cycles are examplified below :

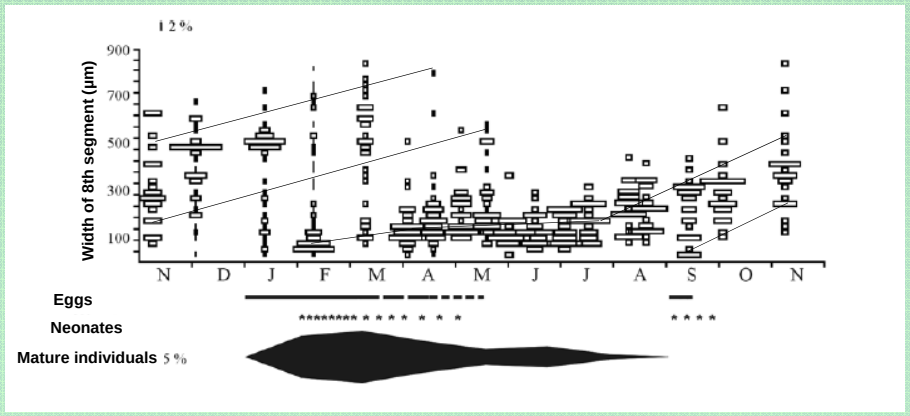

Fig. 2. Life history of *Tubifex tubifex* (Oligochaeta, Tubificidae) in Pond 2. Size-frequency distribution (width of 8th segment) of individuals throughout the year. The presence of eggs, neonate and mature individuals is indicated below the plot. *T. tubifex* has 2 generations per year. Adults are mature from January to August. Reproduction mainly occurs in winter. Eggs are layed from January to April, and in September.

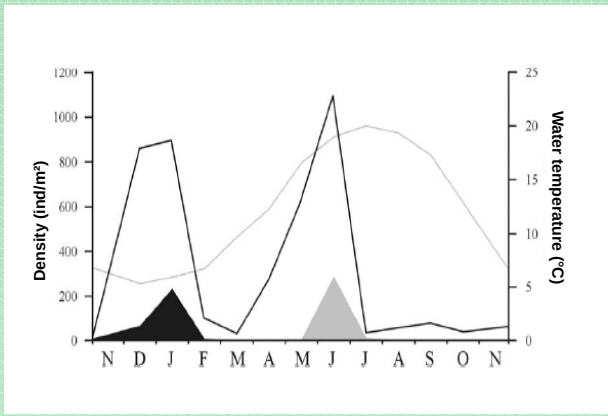

Fig. 3. Population dynamics of *Hydra* sp. (Pond 3). The black solid line indicates changes in population density. Dark area= individuals in asexual reproduction phase; grey area= individuals in sexual reproduction phase. The line in light grey show changes in pond temperature throughout the year. There are 2 peaks in density, which correspond to the alternance to asexual (winter) and sexual (summer) reproduction.

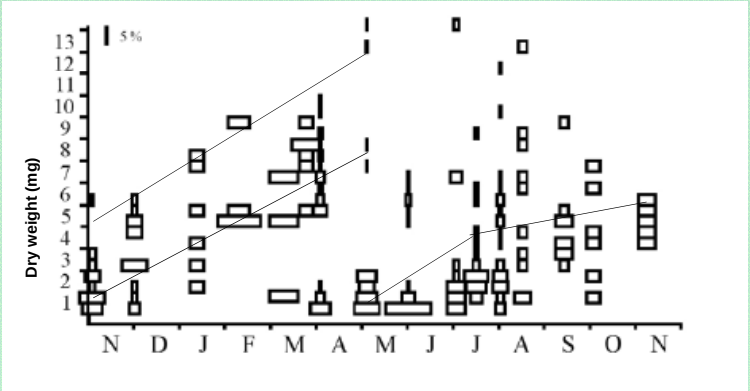

Fig. 4. Life history of *Helobdella stagnalis* (Achaeata, Hirudinae) in Pond 3. Size-frequency distribution of individuals (based on dry weight) throughout the year. There are 2 generations per year, with newly-hatched individuals appearing in spring-summer and in winter. As a result, individuals at all sizes are present throughout the year.

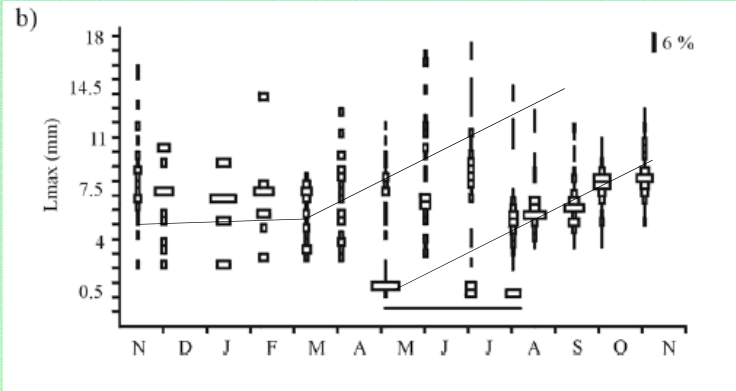

Fig. 5. Life history of Radix labiata (Mollusca, Gastropoda) in Pond 3. Size-frequency distribution of individuals (based shell length= Lmax) throughout the year. There is one generation per year. Hatching occurs in spring-summer, and individual growth is slow.

In contrast to the large volume of studies in river ecology, very little research has addressed the population dynamics of pond invertebrates. Information on the life history of pond species is generally sparse, and usually available for insects. Further life cycle investigations, including the numerically dominant mollusca, Oligochaeta, etc., would provide an overview of life history traits of the pond biota, and would consequently have significant implications for planning management and/or conservation actions in a particular area. For instance, reproduction, hatching or diapause periods need to be carefully considered when restoring, managing and/or creating new ponds for conservation purposes.